MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*Notes on the Land and Fresh Water Mollusca of Great Britain, with a revised list of Species.* By Joshua Alder, Member of the Nat. Hist. Society of Newcastle-upon-Tyne.

Much as has lately been done in the investigation of the British land and fresh water Mollusca, there is yet wanting a good history of our native species, which, like that of Draparnaud in France, or of Pfeiffer in Germany, may claim to rank as a national work. Several local catalogues have appeared, each adding something to our knowledge of these tribes, and it has been still further increased by two valuable monographs,—I allude to the Synopsis of the Testaceous Pneumonobranchous Mollusca of Great Britain, by J. G. Jeffreys, Esq. in the Linnean Transactions, and the Monograph of the British species of Cyclas and Pisidium in the Cambridge Philosophical Society's Transactions, by the Rev. L. Jenyns. Hitherto the only general account of the British species that has been published in a separate form is the Manual of British Land and Fresh Water Shells by Dr Turton. Considering the unpretending and cheap form in which this little work appeared, we cannot expect to find in it a complete history of these tribes; and it has the still farther disadvantage of being an account of the shells only, without taking the animals into consideration. There are also to be found in it several errors in the introduction or omission of species. It is therefore much to be desired that some of our naturalists would undertake to give us a complete and scientific history of our native land and fresh water Mollusca on a plan somewhat similar to that of Pfeiffer's

work above alluded to. The increasing taste for natural history now abroad warrants the conclusion that such a publication would be favourably received, and the materials for it might be readily obtained. In the absence of such a work, it has occurred to me that this Magazine may afford a medium for recording a few observations, made with the view of ascertaining, as far as the present state of our knowledge admits, what are the species of land and fresh water Mollusca really indigenous to these islands. I am far from thinking that I have accomplished this completely; but I shall be satisfied if, by clearing away some difficulties, a ground-work shall be laid for others to pursue the investigation with success. It is not by the contributions of one but of many that complete information is at length to be obtained. In making this attempt, it has been found necessary to discard many species that have hitherto swelled our catalogues. Possibly some of these may be British: all we can say at present is, that there is not sufficient proof to warrant our considering them as natives. As to those Mollusca whose claims to rank as species have been a matter of dispute among naturalists, a few of these will certainly be found in the present list, but they have been generally spoken of with hesitation, in order to induce persons favourably situated for the purpose to make further observations upon them.

It may be necessary to say something concerning the names that have been adopted in the following catalogue. So great is the multiplication of synonyms in this department of natural history, that it has become a difficult matter to decide, in each case, which name ought to be adopted. If we look into three of our latest publications treating of molluscous animals, those, namely, of Fleming, Jeffreys, and Turton, we shall find that, in many instances, the same species has a different name in each. *Helix lackhamensis* of Montagu, for instance, is called by Dr Fleming *Bulimus lackhamensis*, by Mr Jeffreys *Bulimus Montacuti*, and by Dr Turton *Bulimus montanus*. *Turbo tridens* of Montagu is *Azeca tridens* of Fleming, *Carychium politum* of Jeffreys, afterwards changed in his supplement to *Cionella Goodalli*, and *Azeca Matoni* of Turton. Should we wish to trace this species in continental works, we shall find it to be the *Helix (Cochlodonta) Goodalli* of Férussac, *Pupa Menckeana* of Pfeiffer, and *Pupa Goodalli* of Michaud. Thus are we lost in a labyrinth of names, from which it is high time that we should make an attempt to extricate ourselves. It will be said, and is indeed true, that naturalists (with the exception of a few injudicious reformers) are pretty well agreed as to the rule by which the choice of a name is to be governed,—namely, priority of publication. This

rule is applicable, with few exceptions, to all recent cases, where the species described can be properly made out; but it so happens that it cannot conveniently be brought to bear upon names established by long use. Any attempt to change these for such as, though really prior, have not been generally adopted, has usually proved a failure, and only tended to increase the confusion it was meant to avoid. Extent of use, therefore, must be taken into account in judging of established names. I am afraid that on this account we shall be obliged to give up some of the names of Montagu which English authors have hitherto retained on the ground of priority. The "Testacea Britannica" was published in 1803, and the "Histoire Naturelle des Mollusques terrestres et fluviatiles de la France" in 1806. There was thus a priority of publication in the English work over that of France; but notwithstanding this, the authority of Draparnaud has been so thoroughly established, that, though Montagu's book has now been known on the continent of Europe for upwards of twenty years, and his synonyms pointed out in the "Concordance" of Férussac, yet not one of his names has been adopted in preference to those of Draparnaud by a single continental author. Would it not be better, therefore, for the sake of uniformity of nomenclature, that British authors should give up a point which they cannot carry, and agree in adopting the more generally received names of Draparnaud? In conformity with this view, the names of a few species of Helix have been altered in the following list, from those usually given in British catalogues.

Another circumstance which has greatly increased the number of synonyms is the difficulty of making out the species of some of the older writers, particularly those of Linnæus, whose descriptions are often very short and unsatisfactory. Much labour has been in vain bestowed in attempting to ascertain many of the land and fresh water shells of this naturalist, and different authors have referred them to so many different species, that there are instances in which two, three, and even four species have been alternately called by the same Linnæan name, according to the peculiar views of the authors who described them. *Turbo muscorum* of Linnæus may be taken as an example. The shell called *Turbo muscorum* by Montagu, and *Pupa muscorum* by Fleming, under the belief that it is the Linnæan species, is *Pupa umbilicata*, Drap. Lamarck, Férussac, and others, think differently, and give that name to *Pupa marginata*, Drap. Draparnaud himself refers it to a third species, *Verti_o cylindrica*, Fer. which he consequently calls *Pupa muscorum*. But Dr Turton gives it as his opinion that *Pupa edentula*, Drap. is the true *Turbo muscorum* of Linnæus. Thus to understand what

Pupa muscorum means in any catalogue, it becomes necessary, in the first place, to know what authority the writer follows. Some species of Helix, Planorbis, and Limneus are in a similar predicament. It is certainly better in such a case to drop the disputed name altogether, and adopt another about which no doubt exists. A great preponderance of authority may, however, sometimes induce us to retain it.

Important as uniformity of nomenclature is on all hands acknowledged to be, it would be no easy matter to establish it. The days are past when the authority of one great name was sufficient to carry with it the acquiescence of admiring followers. Science is now a republic, and were Linnæus himself to rise from the dead, he would fail to accomplish such an object. It is worth while considering, however, whether a congress of the leading naturalists in each department might not, by mutual concessions, be brought to agree upon adopting a uniform set of specific names. If this were done a great deal would be accomplished towards inducing succeeding writers to adopt the same convenient plan. I mention specific names only, because it is clear that those of general and higher groups, being founded upon our knowledge of nature, must be left to be modified as that knowledge increases; but specific names are mere conventional and arbitrary signs; more or less valuable, indeed, according to their indication of character, yet such as when once adopted it is not necessary afterwards to change. The subject is well worthy the attention of the natural history section of the British Association. I have been led further into the consideration of this subject than is altogether necessary for my present purpose; but the evil complained of is a serious one. Were this obstruction to our progress once removed, and a set of well digested rules agreed upon, we have a guarantee in the increased and increasing facilities of communication now established between naturalists of all countries, and the greater accuracy of description now adopted, that such a barrier would not again arise to obstruct our path, or deter the youthful inquirer from entering upon the fair field of natural history.

It has been attempted, as far as practicable, in the following list, to give, after the name of the genus, that of the author who first instituted it; but where it has been afterwards restricted, a second name is given, indicating the author who used it in the restricted sense in which it is at present taken. In like manner, after the specific name is placed that of the author who imposed it, without any reference to the genus in which it is now used; but where the generic appellation has been changed, the name of the author first applying it in that genus is also added.

MOLLUSCA, Cuv.

1*st Section.* MOLLUSCA CEPHALA, Fér.

Class. GASTEROPODA, Cuv.

Order. PULMONIFERA, Flem. (Les Pulmones, Cuv.)

† Terrestrial.

Fam. LIMACIDÆ, Flem. (Les Limaces, Cuv.)

Gen. 1. ARION, Férussac.

1. *Empiricorum*, Fér.
   Limax ater, Linn.
   L. Subrufus, Linn.
2. *Hortensis*, Fér.
   var. β. Pfeiffer. Griseus, unicolor, fasciâ utrinque nigrâ.
   Limax fasciatus, Nilsson.
   Arion circumscriptus, Johnston, Edinb. New Phil. Journ.

I follow the opinion of M. de Férussac in making L. fasciatus, Nils. a variety of A. hortensis, Fér. The variety only, if such it be, has yet been noticed in this country, and is common in gardens, woods, &c.

Gen. 2. LIMAX, Linnæus, Férussac.

1. *Cinereus*, Linn.—Shell: Limacellus Parma, Turt.
2. *Variegatus*, Fér.—Shell: Limacellus variegatus, Turt.
   Not uncommon in cellars.
3. *Agrestis*, Linn.—Shell: Limacellus obliquus, Turt.
4. *Carinatus*, Leach.—Shell: Limacellus ungulatus, Turt.
5. *Sowerbii*, Fér.

Gen. 3. TESTACELLUS, Cuvier.

1. *Haliotoideus*, Drap.
   var. T. scutellum, Sowerby.

In addition to the localities in the neighbourhood of London, Dr Turton informs us that this species is found in gardens at Plymouth and Bideford. There is good reason, therefore, to suppose that it is a native species. The case is different with T. Maugii, which belongs to a warm climate, and has evidently been introduced along with exotic plants into the nursery where it is now found.

Fam. HELICIDÆ, Jeff. (Les Escargots, Cuv.)

Gen. 4. VITRINA, Draparnaud.

1. *Pellucida*, Mull. Flem.
   V. Mulleri, Jeff.
   Var 1. V. Draparnaldi, Jeff.
   2. V. Diaphana, Jeff.

Mr Jeffreys having kindly favoured me with specimens of his V.

Draparnaldi, I have compared them carefully with specimens of Helicolimax Audebardi, Fér. collected on the continent, and have come to the conclusion that they are not of that species. I am afraid that V. Draparnaldi can only be classed as a variety of V. pellucida, (Helicolimax pellucidus, Fér.) Mr Jeffreys now considers his V. Diaphana to be also a var. of the same. V. Dillwynii appears to be something different, but being founded upon a single dead specimen, it is to be hoped that Mr Jeffreys may be able to obtain additional specimens, and in a living state, in order fully to establish it.

Gen. 5. Succinea, Draparnaud.

1. *Amphibia,* Drap.
2. *Gracilis,* Alder.
   S. oblonga, Turt.

It may require a further investigation to decide whether or not this be really distinct from the foregoing. I have found them plentifully within 100 yards of each other, each retaining its characteristic marks in the colour of the animal and shape of the shell, and unmixed with the other sort. Some foreign species of this difficult genus, quite as nearly allied as this to S. Amphibia, are nevertheless considered to be distinct.

3. *Oblonga,* Drap.

Besides the locality mentioned by Mr Jeffreys, who was the first to introduce this desirable species into the British list, it has been found at Bathgate near Glasgow. Specimens obtained from that place were sent me by Mr Kenyon of Preston a few years ago.

Gen. 6. Helix, Linnæus, Lamarck.

1. *Pomatia,* Linn.
2. *Arbustorum,* Linn.
3. *Aspersa,* Mull.
4. *Nemoralis,* Linn.
5. *Hortensis,* Linn.
   var. H. hibrida, Leach.
6. *Limbata,* Drap.

Found in the neighbourhood of London by Mr G. B. Sowerby, from whom I have specimens.

7. *Carthusiana,* Drap.
   H. pallida, Jeff.
8. *Carthusianella,* Drap.
   H. rufilabris, Jeff.

The var. α of Mr Jeffreys, which he makes synonymous with H. Olivieri, Fér., M. de Férussac considered to be erroneously referred to that species. Both vary very much in size.

9. *Obvoluta,* Mull.

No other locality appears to have been observed for this, since its discovery in Hampshire by Dr Lindsay.

10. *Glabella,* Drap.

H. rufescens, Mont.

11. *Depilata,* Pf.

H. circinata, Fér.

This species is not uncommon on the banks of the sea near Upper Clapton, Middlesex, where I observed it in 1833. The specimens there collected agree perfectly with those of Pfeiffer in Férussac's cabinet. It is not hispid in any stage of growth, but in other respects is scarcely to be distinguished from the following.

12. *Concinna,* Jeff.

This may be a variety of H. hispida, as now supposed by Mr Jeffreys, but is stronger and with the hairs more deciduous than the usual form of that species. It is very generally diffused, commonly taking the place of H. glabella in situations where the latter is not found.

13. *Hispida,* Mull.

14. *Sericea,* Mull.

It is difficult to say whether or not this is the H. sericea of Muller. Having introduced it as such on the faith of the Baron de Férussac, I leave it for further investigation.

15. *Granulata,* Ald.

H. hispida, Mont.

It is needless to repeat here the observations given on this and the foregoing species in another place. The present is surely distinct.

16. *Fusca,* Mont.

17. *Excavata,* Ald.

18. *Lucida,* Drap.

There can be no doubt of this being the H. nitida of Muller, but the name has been so often misapplied, that I feel great reluctance to use it. *Lucida,* though not altogether free from the same fault, is less liable to be misunderstood.

19. *Radiatula,* Ald.

var. H. vitrina, Fér. Tab. des Moll.

20. *Nitidula,* Drap.

var. H. Helmii, Gilbertson, MS.

Mr Gilbertson points out some peculiarities in the habits of the animal, together with the white colour of the shell, as a reason for considering his H. Helmii to be distinct from H. nitidula. Mr G. would do well to publish his observations upon it.

21. *Alliaria*, Miller.

var. H. glabra, Studer?

Mr Gilbertson finds what he considers to be a variety of this species, much larger than the usual size. This variety appears to be the H. glabra of Studer (Férussac, Tab. des Moll. No. 215,) judging from specimens in M. de Férussac's cabinet.

22. *Cellaria*, Mull.

Continental specimens of this shell are larger and rather more open in the umbilicus than British ones, which induced M. de Férussac to think that they might be distinct. The same remark is applicable to H. nitidula, but in both cases, I think, amounting to nothing more than a variety. H. nitens, Fér. Tab. des Moll. is only the English variety of this species in a small state. H. nitens of Michaud, if we may judge from the figures, is H. nitidula, Drap. I suspect his H. nitidula is, like that of Pfeiffer, the var β. of Drap., and H. radiatula of this catalogue.

23. *Pura*, Ald.

var. H. nitidosa, Fér.

Much confusion has arisen in the attempt to ascertain the H. nitidosa of Férussac, Tab. des Moll. of which neither figure nor description has been published. This arises from his quoting H. nitidula, var α. Drap. as a synonym. There happens to be no var. α; but the var. β, which, from his reference to the figures, Férussac must have meant, is our H. radiatula. His specimens are undoubtedly the horn-coloured variety of our H. pura.

24. *Crystallina*, Mull.

H. hyalina? Fér. Tab. des Moll. No. 224, appears to be a variety of this.

25. *Fulva*, Drap.

var. H. Mortoni, Jeff.

A difference of opinion exists between English and continental naturalists, as to whether this species is the H. Trochulus or H. fulva of Muller. This it is impossible now to decide. It is certain, however, that the species now under consideration is the H. trochiformis of Montagu, and H. fulva of Draparnaud. Férussac has called another shell H. trochiformis, and as Draparnaud's name is more generally adopted, it is better to acquiesce in it. H. Mortoni, Jeff. is, I think, only a depressed variety of this. There is a small variety, not uncommon, darker coloured, and with very delicate and beautiful concentric striæ on the base, only visible with a high magnifier, which I at first considered distinct, but on closer examination, slight traces of these striæ are also visible on full-grown and decided specimens of H. fulva. I have therefore not ventured to separate them.

26. *Scarburgensis*, Ald.
H. lamellata, Jeff.

The name of Scarburgensis was given to this elegant little species by its discoverer, Mr Bean of Scarborough, who has done so much for this department of zoology that I feel anxious to retain it in compliment to him. It is to be regretted that Mr Bean had not at once published his discoveries, rather than have left them for others to record. Mr Jeffreys's name is in other respects a better one, and had so far the priority of publication, that the part of the Linnæan Transactions which contained his Synopsis appeared while the first part of the Newcastle Natural History Society's Transactions was in the press. It may be objected to H. lamellata that Férussac has a H. lamellosa, to which it approaches rather too closely.

27. *Aculeata*, Mull.

28. *Pulchella*, Mull.
var. H. costata, Mull.

29. *Pygmæa*, Drap.

Nothwithstanding the information communicated by M. D'Orbigny to Mr Jeffreys, I still hold the opinion that this is the true H. pygmæa of Draparnaud. Many naturalists have erroneously considered it to be the young of H. rupestris.

30. *Rupestris*, Drap.
H. umbilicata, Mont.

31. *Rotundata*, Mull.

32. *Striata*, Drap.
H. caperata, Mont.

I have not seen any British variety of this shell similar to H. candidula, Studer.

33. *Variabilis*, Drap.
H. virgata, Mont.

A very small variety of this, found on the coast of North Devon, is probably the H. maritima, Drap.

34. *Pisana*, Mull.
H. cingenda, Mont.

35. *Ericetorum*, Linn.

Gen. 7. Carocolla, Lamarck.

1. *Lapicida*, Linn. Lam.

Gen. 8. Bulimus, Bruguiere.

1. *Acutus*, Mull. Brug.
2. *Montanus*, Drap.
3. *Obscurus*, Mull. Drap.

Bulimus Clavulus, Turt. cannot be considered a native species. It appears, however, to have spread beyond the limits of Mr Miller's nursery at Bristol, as Mr Williamson of the Manchester museum, showed me specimens obtained from a garden in that neighbourhood. B. Decollatus, Drap. is similarly situated, and has even less claim to be considered as British. Dr Turton introduces B. articulatus, Lam., and B. ventricosus, Drap. into his Manual, and informs us that they were sent to him "from the plains about Penzance, in Cornwall;" but by whom found or transmitted to him we are not informed. B. articulatus, Lam. is, according to M. de Férussac, a variety of B. acutus; and if he was right, which there is no reason to doubt, in the specimens he gave me under that name, it is certainly an inhabitant of this country, but not a species. Dr Turton's shell, however, now in the cabinet of William Clark, Esq. of Bath, is of another and very distinct species, not known, I believe, to inhabit Europe. Some more satisfactory information must, therefore, be obtained before admitting this, or the B. ventricosus, into the British list. Bulimus tuberculatus, Turt. appears to have been introduced by some mistake of Captain Blomer, who, I am afraid, was not sufficiently careful in keeping his English and Foreign specimens separate from each other.

Gen. 9. ACHATINA, Lamarck.

1. *Acicula,* Mull, Lam.

2. *Lubrica,* Mull. Mich.

Most modern authors (Férussac, Michaud, Mencke, Jeffreys, and Bouillet,) agree in detaching this species from Bulimus. Its close affinity to Achatina foliculus, Lam. points out its place in this genus, but it forms a link between the two. Perhaps Mr Jeffreys's genus Cionella ought to be adopted for this section of Achatina.

A. Octona has no real claim to be considered as British.

Gen. 10. AZECA, Leach.

1. *Goodalli,* Fér. Ald.

Gen. 11. CLAUSILIA, Draparnaud.

1. *Bidens,* Mull. Drap.

Turbo laminatus, Mont.

The specific name of Bidens has become rather ambiguous on account of having been applied by Linnæus and Muller, to two distinct species. The weight of authorities, however, is so much in favour of retaining it for this species, that I hesitate not to do so.

2. *Ventricosa,* Drap.

T. biplicatus, Mont.

Férussac originally referred T. biplicatus, Mont. to C. ventricosa, Drap., but he afterwards adopted the opinion that they were distinct. The British shell is more slender and spindle-shaped than the continental one, but the difference scarcely amounts to any thing more than a variety.

3. *Rolphii,* Leach.

Distinct from *C. plicatula,* Drap., to which it has been referred.

4. *Dubia,* Drap.

Found in several places in the north of England.

5. *Rugosa,* Drap.

var. C. parvula, Turt.

The C. parvula of Dr Leach, (specimens in the British Museum,) f Mr Jeffreys, and of Dr Turton, all belong, I think, to the same ariety of C. rugosa, and not to C. parvula of Studer.

Turbo labiatus, Mont. (Clausilia solida, Drap.) has long stood in ur British catalogues. It is stated to have been found in the neighcurhood of London about fifty years ago. The localities named re Hyde Park and Battersea Fields, but it is not now to be found a either of those places, and as the shells of this genus resemble ach other very closely, it is probable that there may be some mistake i the species noticed. C. ventricosa is not uncommon at the roots of illows in Battersea Fields. The only specimens of C. solida, Drap. ow in collections of British shells, appear to have come from the binet of Mr Humphreys, but the evidence of their native origin is ot very satisfactory. C. papillaris, Drap. (C. bidens, Turt.) has so obtained a place among our native species. On this subject Mr orbes has favoured me with the following very satisfactory informaon. He says, " I have lately obtained a manuscript copy of Lasey's North British Testacea, written by himself, which fully exains the history of the *British* Clausilia papillaris. He states that was found by him in Granton Park, near Edinburgh, and that it as imported from abroad in moss round the roots of some exotics."

Turbo (Clausilia) Everetti, Miller, is a variety of C. rugosa.

Gen. 12. Balea, Gray.

1. *Fragilis,* Drap. Gray.

Gen. 13. Pupa, Draparnaud.

1. *Umbilicata,* Drap.
2. *Marginata,* Drap.
3. *Anglica,* Fér., Ald.
4. *Secale,* Drap.

Gen. 14. VERTIGO, Muller.

1. *Edentula*, Drap. Pf.
   V. nitida, Fér.
2. *Cylindrica*, Fér.
   Pupa muscorum, Drap.

Since Mr Jeffreys's discovery of this beautiful little species on Durdham Downs, Mr Forbes has met with it near Edinburgh, and has also had it sent him from the west of Scotland.

3. *Pygmæa*, Drap.
4. *Alpestris*, (Fér.) Ald.

Found at Clithero, Lancashire, by Mr Gilbertson; and in Northumberland by Mr J. Thompson.

5. *Substriata*, Jeff.
   Pupa sexdentata, Ald., Turt.
6. *Palustris*, Leach.
   Pupa antivertigo, Drap.
7. *Pusilla*, Muller.
8. *Angustior*, Jeff.

The difference between this species and the preceding appears to be more in the number of teeth than the contour of the shell, and if the former is permanent, it is undoubtedly the better character of the two.

Fam. CARYCHIADÆ, Jeff.

Gen. 15. CARYCHIUM, Muller.

1. *Minimum*, Mull.

Gen. 16. ACME, Hartmann.

1. *Lineata*, Drap., Hart.

Fam. CYCLOSTOMIDÆ. (Cyclostomacea, Mencke.)

Gen. 17. CYCLOSTOMA, Lamarck.

1. *Elegans*, Mull., Lam.

C. Productum, Turt. is a foreign shell picked up in Ireland.

C. subcylindricum, Flem. is a marine species (Truncatella Montagui, Lowe, Zool. Journ.) C. truncatum, Jeff. I take to be the same in a different stage of growth.

†† Fluviatile.

Fam. LIMNEADÆ, Jeff. (Les Limnéens, Fér.)

Gen. 18. PLANORBIS, Muller.

1. *Corneus*, Linn., Drap.
2. *Marginatus*, Drap.
   var. Pl. rhombæus, Turt.

A variety of this shell, found near Edinburgh, is entirely without keel. Pl. turgidus, Jeff. is also a variety of this.

3. *Carinatus*, Mull.

4. *Disciformis*, Jeff.

I am not very sure, even after the examination of Mr Jeffreys's specimens, that I perfectly understand the distinction between this and the preceding species. The degree of carination is so very variable in different individuals of the same species, that it is rather fallacious as a distinguishing character. Further observations on this species are desirable.

5. *Vortex*, Mull.

6. *Spirorbis*, Mull.

7. *Lævis*, Ald.

Besides the localities in Northumberland mentioned in the Newcastle Natural History Society's Transactions, this species has been found in Ireland by W. Thompson, Esq. of Belfast, and there are specimens (unnamed,) in the Museum of the Jardin des Plantes at Paris from Granville; so that, though it has remained so long unnoticed, its range is considerable.

8. *Deformis*, Lam.

Pl. Spirorbis, Drap.

Pl. Draparnaldi, Shep. Jeff.

Pl. complanatus, Turt.

First introduced into our Fauna by the Rev. R. Sheppard, who found it in Suffolk. A specimen in my cabinet, from the rejectments of the sea near London, was submitted to the inspection of Dr Turton, who pronounced it to be of this species, and only the third he had seen, the two others being in his own cabinet. These latter I do not recollect to have seen in the possession of Mr Clark. Concerning my own specimen, there is considerable doubt whether it be in fact anything more than a variety of Pl. albus. It is a dead and unbleached shell, with a slight marginal keel, but exhibiting faint traces of spiral striæ under a magnifier. Mr Jeffreys has two specimens, also dead shells, which he refers to this species. They are from the rejectments of the river Taaf, near Cardiff. Pl. complanatus of Turton's Manual appears to be this species, though he makes no reference either to Draparnaud or Lamarck. It is rare in the collections of French naturalists. Pfeiffer makes Pl. deformis, Lam. a variety of Pl. albus; but Ferussac considered it distinct, and called it Pl. acronicus. It is desirable that it should be observed in a living state.

9. *Albus*, Mull.

Var. Pl. glaber, Jeff.

An examination of Mr Jeffreys's specimens of Pl. glaber confirms

me in the opinion that it is a variety of this species. In some specimens of Pl. albus, the spiral striæ are scarcely discernible, even in a living state, and become quite obliterated in dead shells.

10. *Contortus,* Linn. Mull.

11. *Lineatus,* Walker, Jeff.
P. clausulatus, Fer.
Segmentina lineata, Flem.

The tripartite partitions in this shell, though remarkable, are scarcely sufficient to raise it to the rank of a genus. The animal is exactly that of a Planorbis.

12. *Nitidus,* Mull.
Pl. complanatus, Drap.

As the Pl. nitidus of Muller evidently includes both this and the last species, authors differ much in opinion as to which of them should bear the name. To avoid the confusion that has hence arisen, it would be better to drop it entirely, and take for this species the name of lenticularis, which is given to it by some continental authors, and is very characteristic.

13. *Imbricatus,* Mull.
Var. Pl. cristatus.

Gen. 19. Physa, Draparnaud.

1. *Fontinalis,* Linn. Drap.

2. *Hypnorum,* Linn. Drap.

The difference between the animals of this and the former species perhaps justifies Dr Fleming in establishing the genus Aplexa for the present. A better knowledge of the other animals of this genus would enable us to separate them with more confidence.

Three other species of Physa have been described as British. Two of these, Bulla (Physa) rivalis, Maton, and B. fluviatilis, Turt. Mr Jeffreys supposes, with some probability, to be varieties of P. fontinalis. There is every reason to believe that Physa alba, Turt. is a foreign species.

Gen. 20. Limneus, Draparnaud.

1. *Stagnalis,* Linn. Drap.
Var. H. fragilis, Linn.? Mont.
Young, L. Scaturiginum, Turt.

2. *Palustris,* Linn. Drap.

This is a very variable species, and has been divided into three or four by continental authors, upon the propriety of which division it is not easy to decide. There is a reputed variety inhabiting this country (var. β. Jeff.) which seems to have some claim to the rank of a species. It is found on the margins of rivers in different parts

of England, frequently within tide-way. It never grows to half the usual size of the species found in ponds, and is intermediate between that and the following.

3. *Minutus*, Drap.

A variety of this, much smaller in size, is also found on the margins of rivers. It is the var. γ. of Draparnaud, concerning which he says, " J'ignore si ce n'est pas une espèce distincte." The small variety is also found in mountain streams. A careful examination of this genus may enable malacologists to discover more definite characters to distinguish this species than those already employed.

4. *Elongatus*, Drap.

5. *Pereger*, Drap.

Var. 1. L. ovatus, Drap.
2. L. lineatus, Bean.
3. Helix lutea, Mont.
4. Gulnaria lacustris, Leach.

6. *Acutus*, Jeff.

This species is intermediate between L. pereger and L. auricularius, and, if not distinct, may, Mr Jeffreys observes, lead us to unite them all into one. It comes very near L. lineatus, Bean.

7. *Auricularius*, Linn., Drap.

8. *Involutus*, Thompson, MS.

Mr Thompson of Belfast announced the discovery of this beautiful new species to the Linnæan Society in 1834, and we shall no doubt be gratified with a description of it in his promised catalogue of Irish land and fresh water Mollusca. It would be interesting to know if the animal corresponds with that of L. glutinosus, as this circumstance, taken in conjunction with the shape of the shell, would go far to establish Nilsson's genus Amphipeplea.

9. *Glutinosus*, Mull., Drap.

Amphipeplea glutinosa, Nils.

Concerning L. detritus, which has so long appeared on our lists, I can add nothing to what has already been said by Dr Turton and Mr Jeffreys. Since the former gentleman withdrew his statement of having found this species in Ireland, Mr Bryer remains our only authority for considering it as British; but whatever the original shell found by Mr Bryer may have been, the specimens now in English cabinets appear all to belong to the genus Bulimus, and are most likely foreign. Captain Blomer sent me a foreign Paludina for this shell a few years ago.

The genus Auricula has not been included in this catalogue, though one of the species, A. denticulata, may be considered to be more fluviatile than marine. I found this species last summer on

the muddy margin of the river Wye, four miles from its junction with the Severn, generally out of the water, but within tide-way. Its habits are somewhat similar to those of some species of Limneus; indeed, a little further up the same river, nearly opposite Tintern, its place is taken by the small variety of L. palustris before-mentioned as common in such situations.

Fam. Ancylidæ, (Ancylea, Mencke.)
Gen. 21. Ancylus, Geoffroy.

1. *Fluviatilis,* Mull.
2. *Lacustris,* Mull.

Ord. Pectinibranchia. (Pectinibranches, Cuv.)
Fam. Turbinidæ. (Les Sabots, Cuv.)
Gen. 22. Paludina, Lamarck.

1. *Vivipara,* Linn., Lam.
2. *Achatina,* Drap., Lam.
3. *Impura,* Drap., Lam.
4. *Similis,* Drap.
5. *Anatina,* Drap. Mich.

This species has been found in Greenwich marshes by J. E. Gray, Esq. to whom I am indebted for specimens. Though living so far inland, it appears to belong to a littoreal genus, rather than to Paludina, from which it differs in having a spirally grooved operculum.

Cyclostoma acutum, Drap. (Paludina muriatica, Lam.*) is now well known to be a marine species, allied to Turbo Ulvæ of English writers, and abundant on many of our sandy coasts. P. Viridis of Turton's Manual I take to be the young of P. similis, judging from specimens in Mr Clark's cabinet. His P. stagnorum is probably a more slender variety of the same; but in the absence of specimens it is impossible to decide. Dr Turton does not give any localities for either of these species.

Gen. 23. Assiminea, Leach.

1. *Grayana,* Leach.

Allied to the littoreal tribes.

Gen. 24. Valvata, Muller.

1. *Piscinalis,* Mull., Lam.

Var. V. depressa, Pfeiffer.

* Lamarck refers his P. muriatica to C. anatinum, Drap., but I follow Férussac in considering it to be the C. acutum. Michaud places these two in a separate division of the genus, which he calls "Espèces des eaux saumâtres."

Specimens of V. depressa, Pf. were sent me from Lancashire some years ago by Mr Kenyon. They are exactly similar to those in Férussac's cabinet, received from Pfeiffer himself; but it can scarcely be considered more than a variety of V. piscinalis.

2. *Cristata,* Mull.

V. spirorbis, Drap.

Dr Turton has introduced two other species, V. planorbis. Drap. and V. minuta, Drap. into his Manual, but no specimens of them are now to be found in his cabinet. I took some pains to investigate these two species when in Paris. On examining three of the principal collections there, those of the Jardin des Plantes, the Baron de Férussac, and the Prince Rivoli, in the latter only I found anything under the name of V. planorbis. The specimens were V. cristata, Mull. M. de Ferussac had specimens under the name of V. minuta from two different individuals. Those from Pfeiffer are, I think, the young of V. cristata; and the others (I forget from whom, but with the name of Draparnaud,) the young of V. piscinalis. Mr Miller introduced V. minuta into his Catalogue of the Land and Fresh water Shells of the environs of Bristol, but no specimen of it is preserved in the Bristol Museum. Dr Turton says that his V. minuta is the Helix serpuloides of Montagu. This is well known to be a marine shell, referable to the genus Skenea of Fleming. Mr Thompson of Belfast has, however, favoured me with the examination of a shell, which may possibly turn out to be the V. minuta, Drap., though I suspect it to be marine.

Fam. NERITIDÆ, Turt. (Les Nérites, Cuv.)

Gen. 25. NERITINA, Lamarck.

1. *Fluviatilis,* Lin. Lam.

2d Section. MOLLUSCA ACEPHALA, Fer. (Les Acéphales, Cuv.)

Class.—CONCHIFERA, Lam. (Acéphales testacés, Cuv.)

Ord.—LAMELLIBRANCHIA. (Lamellibranches, Cuv.)

Fam.—MYTILIDÆ. (Les Mytilaces, Fér.)

Gen. 26. DREISSENA, Vanbeneden.

1. *Polymorpha,* Pallas, Vanb.

This species, being found in three localities in England, and one in Scotland, seems now to have regularly established itself in our island.

Fam. NAIADÆ. (Les Nayades, Fer.)

Gen. 27. ANODON, Oken. (Anodonta, Lam.)

1. *Cygnæus,* Lin. Lam.

2. *Cellensis,* Pf.
3. *Intermedius,* Lam.
4. *Anatinus,* Lam.
5. *Ventricosus,* Pf.

Gen. 28. Unio, Bruguiere.

1. *Margaritiferus,* Lin. Nils.
2. *Tumidus,* Nils.
   Mysca solida, Turt.
   ovata, Turt.
3. *Pictorum,* Linn. Lam.
4. *Rostratus,* Lam.
5. *Batavus,* Lam.

The foregoing is given as the nearest approximation to a correct list of the British species of Anodon and Unio (according to the views of Pfeiffer) which the present state of our knowledge will allow; but so various are the opinions of authors on these difficult genera, and so little have the British species been investigated, that we are much in need of further information on the subject.

Fam. Cycladæ, Flem. (Les Cyclades, Fér.)

Gen. 29. Cyclas, Bruguiere.

1. *Rivicola,* Leach.
2. *Cornea,* Linn., Lam.
3. *Calyculata,* Drap.
   Var. C. lacustris, Turt. Ald.

The Cyclas lacustris of Draparnaud is certainly unknown to British naturalists; but as the species is described by most of the continental authors, we might naturally conclude that they were well acquainted with it. The contrary, however, appears to be the fact. M. de Férussac, who, from his extensive correspondence, might have been expected to possess the best information on the subject, gave me a variety of C. cornea (frequently found in this country) as the supposed C. lacustris, Drap. This, though slightly rhomboidal in outline, does not agree very well with Draparnaud's description. Mr Clark has a shell obtained in Devonshire which comes nearer to it. It is to be hoped that this gentleman will shortly lay before the public the store of very valuable information on British Molluscous animals of which he is possessed.

Gen. 30. Pisidium, Pfeiffer.

1. *Obtusale,* Pf.? Jen.

2. *Pusillum,* Turt.? Jen.
3. *Nitidum,* Jen.
4. *Pulchellum,* Jen.
5. *Henslowianum,* Shep. Jen.
6. *Cinereum,* Ald.
7. *Amnicum,* Mull., Jen.

The excellent monograph of the Rev. L. Jenyns has been implicitly followed in this family, with the single exception of the introduction of an additional species of Pisidium, described in the second volume of the Newcastle Natural History Society's Transactions.

II.—*On the Botany of Erris, County Mayo, and a notice of several additions to the Flora Hibernica.* By Charles C. Babington, M. A., F. L. S., &c.

As the western part of Ireland is not well known to English naturalists, a short account of my botanical observations, made during a tour in the counties of Mayo and Galway, but more particularly the former, may perhaps be acceptable. Had this district been even moderately known, I should not have presumed to introduce so very imperfect a sketch of its native flora, but when I find that it is scarcely noticed in Mr Mackay's Flora Hibernica, I cannot avoid thinking that even these cursory observations may be interesting to British botanists.

It was about the middle of the month of July 1836 when I arrived at Westport, a small town at the head of Clew Bay, county of Mayo, and determined upon visiting the wild district of Erris. But, during a morning walk, previously to starting for that country, I noticed the following plants, most of them, indeed, very common, yet considered worthy of notice, as showing one of the most westerly points of their range. It may perhaps be as well to add, that this is the nearest land to America, although this is not the most westerly part of Ireland.

On the cultivated land the following plants occurred: Scrophularia nodosa, Sonchus oleraceus, S. asper, Circæa lutetiana, Veronica agrestis, V. polita.

In a bog upon the north side of the harbour, and which is probably sometimes overflowed by the tide: Plantago maritima, Triglochin maritimum, Linum catharticum, Glaux maritima, Spergula nodosa, Samolus valerandi, Rumex hydrolapathum, Anagallis tenella, Carduus pratensis, Ranunculus hederaceus, Hypericum humifusum, Phalaris arundinacea.

I also noticed, in the same bog, a species of Rumex differing very

materially from R. crispus, and which I referred, upon the spot, to R. pratensis. It was unfortunately in too young a state for me to obtain any ripe fruit, and my friend, Mr Borrer, was therefore unable to determine it with certainty from my specimens. It is much to be wished that some botanist, who may visit that county in the autumn, would pay attention to it. I shall point out several other stations for it before concluding this paper.

At a distance of forty-three Irish miles from Westport, and at the upper end of Black Sod Bay, is situated the little town of Bellmullet. This place is the capital and only town in the barony of Erris. For the greater part of that distance, the road to Bellmullet passes over uncultivated and almost uninhabited bogs and mountains.

At Lough Clunon, a few miles from Westport, I gathered Carduus pratensis, which is common throughout the counties of Mayo and Galway, and also the following plants: Eriophorum angustifolium, Erica tetralix, E. cinerea, Potentilla comarum, Myrica gale, Lobelia dortmanna, Habenaria chlorantha, Hieracium paludosum, Hypericum pulchrum, Polypodium vulgare, Blechnum boreale.

A few miles farther on by the side of Lough Beltra, a beautiful lake surrounded by mountains, I noticed Polygonum persicaria, Chrysanthemum leucanthemum, Raphanus raphanistrum, Pedicularis palustris, and upon the ledges of some fine rocks near to the police station, I found the reflexed form of Aspidium dilatatum, which is mentioned in Sir W. Hooker's Brit. Flora, p. 451, (note;) and also a very curious variety of Asp. filix-fœmina, having its pinnules very broad and deeply inciso-serrate, the teeth sharp, and sometimes again serrated. A very few specimens occurred, but they were full of fruit.

We stopped for the night at a farmer's cabin, close to the foot of the lofty mountain called Nephin, and having a few hours of daylight remaining, I ascended to nearly its highest point. It consists of a lofty ridge, sloping down gradually at both ends, but very steep upon its sides. The summit is bare, and I only noticed the following plants: Solidago virgaurea β. cambrica, Saxifraga umbrosa, Vaccinium vitis-idæa, Empetrum nigrum, Melampyrum sylvaticum.

In the bogs at its foot were the following: Rhynchospora alba, Drosera anglica, D. rotundifolia, Schœnus nigricans, Gnaphalium sylvaticum, β. rectum, Peplis portula.

A small quantity of natural wood occurs upon the lower slope of the mountain, and by the side of a neighbouring river. It consists of Ilex aquifolium, Pyrus aucuparia, Quercus robur, Alnus glutinosa, Betula alba, and Corylus avellana. They must be considered as

little more than bushes, few of them forming trees. In this wood I noticed Carex extensa and Valeriana officinalis.

The road from Nephin towards Erris now passes, for many miles, over an extensive bog, bounded, both towards the north-east and south-west, by lofty mountains. The latter range is of extraordinary beauty; it includes the lofty and rugged summits of Nephin-beg and Curshleve. These mountains would, no doubt, well repay the botanist, but they are nearly inaccessible from the total want of accommodation, even of the poorest kind, within many miles of their base. Their unfrequented recesses are still inhabited by a few red-deer.

A large portion of these bogs might be brought into cultivation at a comparatively small expence. They are seldom perfectly flat, and in many parts their slope is considerable. The subsoil is often of a sandy nature, being apparently formed of the decomposed mica slate and quartz rock from the neighbouring mountains. There is frequently good natural pasture upon the banks of the rivers. This is probably occasioned by the annual supply of sand brought down by the winter torrents.

After passing this dreary country, we enter Erris by crossing the large river Owenmore. The road follows its course for some miles, descending a fine valley denominated Glan Co. This valley is seldom more than a mile in width, usually much less, and, in almost all parts, might easily be brought into cultivation. It is bounded by hills, which are steep but of moderate elevation, and, but for its total want of trees, would be one of the most beautiful spots in the kingdom. I here noticed Habenaria chlorantha, Potentilla comarum, Myosotis repens, M. cæspitosa, Carex ovalis, Hypericum quadrangulum.

At the further end of Glan Co is the small village of Bangor. This is a poor place, consisting of a few cabins, and two or three moderate houses. The remaining ten miles to Bellmullet is perhaps the most interesting part of the whole road from Westport, being much varied with bog and mountain, passing near the large sheet of water, Lough Garrowmore, through a narrow pass, denominated Glan Castle, and commanding a succession of grand and extensive views of the Erris mountains, the Isle of Achill and the broad expanse of the Atlantic. The entrance to Glan Castle is so narrow as only to admit the road which is cut out of the rock, and a small river to pass between the steep declivities by which it is bounded. Just at its entrance there is a fine basaltic dike, which stands out from the hill side like a stone-wall. In this pass I noticed Hypericum androsæmum, Scirpus Savii, Aspidium dilatatum, and its con-

cave variety mentioned before; also Asp. filix-fœmina with fronds of more than five feet in length. I may mention that I captured here a single specimen of Carabus clathratus.

The valley of Glan Castle gradually widens into an open undulating country, which extends on all sides as far as the ocean. From the top of a slight eminence, a most extensive view is obtained, including Broad Haven, Black Sod-Bay, the whole extent of the Mullet, and the distant summits of the mountainous island of Achill.

Black Sod Bay and Broad Haven are separated by a very narrow neck of land; in one place it is not more than 100 yards from sea to sea. The little town of Bellmullet is built upon this neck of land, so that its main street extends to the high-water-mark of both those deep inlets. It has not been many years in existence, and is now in a flourishing state.

The northern part of the Mullet is an extensive boggy moor, on which I gathered Drosera rotundifolia, Schœnus nigricans, Helosciadium nodiflorum, Myosotis repens, Œnanthe crocata, Osmunda regalis.

On a few patches of cultivation Carduus pratensis and Senecio viscosus abound, and in flax-fields, Camelina sativa is frequent.

On the western shore I noticed Scirpus Savii, Arenaria peploides, Glaux maritima, Plantago coronopus in a very diminutive state, Spergula nodosa, Anthyllis vulneraria, Orchis latifolia, O. maculata, and Papaver dubium. At the distance of about a mile south of Binghamstown, in a lane leading from Drumrhe to Crosslake, I found Callitriche pedunculata in plenty, and, at a short distance to the north of the same place, Lathyrus pratensis and Vicia cracca are common in the pastures. I here noticed the Rumex mentioned before as closely resembling R. pratensis. I may add that it also occurs upon the waste ground below Sir R. O'Donnel's house at Newport, county Mayo.

The southern part of the Mullet is being gradually overwhelmed by drifting sands, and the extreme point consists of a hill of granite. In this sandy district Achillæa millefolium puts on a peculiar appearance, becoming quite dwarfy, and extremely woolly. From the top of the granite there is a splendid view of the Isle of Achill, the lofty mountains of Erris, and the Atlantic ocean.

After returning to Westport, I again visited Cunnamara. I need say little of that interesting district, having elsewhere given a detailed account of it.* I visited several parts of that country on the present occasion, which I had been unable to inspect during my

* In Vol. ix. page 119, of Loudon's Mag. of Natural History.

previous tour, and was still more impressed with the peculiar grandeur of its mountain scenery. I certainly do not know of any spot in the British Islands which will so well repay a visit.

In Cunnamara I made numerous inquiries concerning the bog timber, and was informed that two very distinct kinds of deal are found in great plenty. One of them has a twisted stem, burns with a clear flame and fine scent; it is used for torches, and is called Corchep by the people. The other is not twisted, is far better for the ordinary purposes of timber, and is said to have a much larger root in proportion to its stem than the Pinus sylvestris. I have reason to think that the true Scotch fir (P. sylvestris) has *not* been found in a wild state in Ireland, nor have I seen any proof of its occurring in the bogs. From its being the only fir known to be a native of Great Britain, it has been taken for granted that it was also the only one in Ireland. I am sorry to see that my friend Mr Mackay has adopted this idea in his valuable Flora Hibernica. He says that the roots of the Scotch fir, obtained from the bogs, are used as torches. This is worthy of experiment, and since the old roots must be plentiful in the Scotch pine forests it may very easily be ascertained.* I need hardly add that several different layers of bog timber are found, and that therefore there is no reason to doubt that the trees grew upon the bog itself. As no trees are now growing naturally upon the bogs, it is a point of great interest to ascertain what species are best suited for so peculiar a situation. I had great hopes of being able to determine at least one of these species, by obtaining some of its cones, but although I was informed by several intelligent men that they were often found, and that they would undertake to obtain them for me, I have recently learned that they have been disappointed in their researches.

Eriophorum polystachion is frequent in Cunnamara, and may always be distinguished from E. angustifolium, by its broad, flat, and keeled leaves. At Roundstone I gathered Arabis ciliata, growing in the chinks of granite rocks, and again visited the stations of Eri-

* The roots of pine which are found in the Scotch bogs are dug up, split, and used for torches instead of candles, and appear to possess all the qualities of ready and bright combustion ascribed to the Irish bog timber by Mr Mackay. (See Lightfoot, Hooker, &c., and the writings of other botanists of Scotland.) The roots of the Scotch fir (Pinus sylvestris,) which form our modern plantations, are in many parts dug out, split, and dried, and are used as lights for spearing salmon. The splinters are placed in a narrow grating fixed in the boat, give a clear and brilliant flame, which by keeping the fire supplied may be kept up for hours. Trees that have been blown down are generally preferred for this purpose.—Eds.

ca Mediterranea and Mackaiana. The former has now been gathered in several other parts of Mayo and Galway, and, although the latter is still only known to occur in one spot, yet I am more and more confirmed in the opinion that it is a truly distinct species.

Upon a wooded hill that projects into Lough Corrib, called Drumsna, I noticed Hymenophyllum Tunbridgense and H. Wilsoni, Rubus idæus, Hieracium umbellatum, Scolopendrium vulgare, and the concave variety of Aspidium dilatatum. Near to Flinn's house there is a great quantity of Osmunda regalis.

In conclusion, I would point out the two following plants as new to the Irish flora, *i. e.* Callitriche pedunculata, found in the Mullet, and Myosotis repens, which is common in Cunnamara, at Westport, and in Erris. I carefully examined Cushtrower Bay, but was unable to find Atriplex pedunculata.

My friend, E. Hill Esq. of Oxford, informs me that he gathered Eriophorum pubescens at Woodlawn, near Killconnel, county Galway. This is its second Irish station. He also mentions that Miss Trench has discovered Euphorbia peplis at Garreries Cove, near Tramore, county Waterford. This is not contained in my friend Mackay's Flora Hibernica. Mr Hill was so good as to show me specimens of both these plants. From the accidental loss of a specimen, Fedia auricula was omitted by Mr Mackay. I gathered it, as mentioned in Loudon's Magazine, at Oughterard, county Galway, in the month of August 1835.

St John's College, Cambridge,
March 20, 1837.

III.—*Notes upon Subaquatic Insects, with the description of a New Genus of British Staphylinidæ.* By J. O. Westwood, F. L. S. &c. Plate IV.

The economy and physiological peculiarities of those species of insects and other annulose animals, which, although organized for aerial respiration, are enabled to abide in situations, which are indeed their natural habitats, where they are for a very considerable period of time entirely submerged beneath the surface of waters, are extremely interesting, and well worthy of a more scientific investigation than has hitherto been given to them. The habits of the diving water spider (Argyroneta aquatica, *Latr.*) have been long ago observed by De Geer and others, but up to the present time, as we learn from Mr Kirby's Bridgewater Treatise, the precise manner by which this spider is enabled to envelope itself in a dome of air, and

to descend with its miniature diving-bell to the bottom of the water in which it resides, has not yet been discovered. The observation of spiraculated aquatic imagines will not very greatly assist us in this inquiry, because we find no uniformity existing in their mode of inspiration; thus, when the perfect Dyticideous beetles ascend to the surface of the water, they expose the extremity of the body, and thus admit air into the space which exists between the upper surface of the abdomen and the closed elytra; whereas in the Hydrophilidæ the head is brought to the surface of the water, and then one of the clavate antennæ is projected, the club of these organs being covered with fine hair. This club is, however, so twisted that whilst the base is exposed to the air the extremity is brought in contact with the breast, which, as well as the whole under side of the insect, is covered with short silky pubescence. "By this means," observes Burmeister, "a communication is made with the external air and that beneath the water covering both the clava of the antennæ and the whole under surface of the insect, to which it adheres by means of the coating of down; and by this communication fresh air is transmitted to the venter of the insect, and by the same means the expired air is also removed, and the air is likewise transmitted from the ventral surface beneath the elytra, where it is in, and expired by the spiracles there situated." *

This distinction appears to me to result entirely from the presence or absence of the coating of plush or fine down, with which the bodies of some of these insects are provided, because in the Dyticidæ, which do not respire by means of a supply of air coating the underside of the body, we find the body not externally covered with this coating of plush.

The genus Nepa offers a still more remarkable modification in the structure of its respiratory organs and mode of respiration. On examining an insect of this genus, the spiracles appear at first sight to be in the ordinary position and of the ordinary form; but we learn from M. Dufour's admirable Recherches Anatomiques sur les Hemipteres, that these spiracles have no orifice and are quite useless, the only spiracles being two, which are placed at the base of the anal setæ. Thus it is only by thrusting these setæ out of the water that the insect can obtain a supply of air.†

The insects to which we have directed our attention are enabled to swim with greater or less facility, and hence it is that they can obtain fresh supplies of external air at pleasure; moreover, for

* Manual of Entomol. p. 392, Shuckard's translation.

† See Brit. Cyclop. Nat. Hist. Vol. ii. p. 870. fig. 150.

the most part, they frequent still waters, and their movements are not influenced by the agitated state of the fluid in which they reside.

But there are other insects which pass a great portion of their lives under water without possessing the power of swimming about, and thus obtaining at will due supplies of air ; and there are others which, in addition to this deficiency, are inhabitants of situations which for hours, days, and even weeks are entirely covered by the rolling tide of the sea, it being only at the period of neap-tides that the spots where they are found are left uncovered by water.

M. Dutrochet has endeavoured to explain the manner in which respiration is effected in the first of these cases, in a memoir upon the larva of a moth, Hydrocampa potamogeta, read before the Academie des Sciences, which, as well as the pupa, resides constantly, although provided with spiracles and not with branchiæ, beneath the surface of stagnant water. " Il arrive pour cette chenille," according to this author, " qu' épuissant par l'act de la respiration l'oxygène de l'air atmosphérique qui l'environne l'azote restant se dissout dans l'eau et en extrait du gaz oxygène. Mais en même temps le gaz acide produit par la respiration se dissout aussi dans l'eau et en extrait l'air atmosphérique, dont l'oxygène sert naturellement à la respiration et dont l'azote répare la perte du gaz azote dissous." This may indeed perhaps be considered as the real solution of the chief inquiry, but there are so many differences both of economy and structure in the subaquatic insects, that it must be evident, that by minutely investigating each, we may arrive with greater certainty at the general truth. Moreover, as in the case of those natatorial species which from time to time come to the surface of the water for fresh supplies of air, the respiratory process is probably different from those which are constantly beneath its surface, as in the larva of the water moth above-mentioned. We may consider those species which, at certain periods, do obtain supplies of fresh air, but in such small quantities as not to last for their consumption for the long space of time they may be submerged, as occupying an intermediate station between these two groups breathing fresh air at one period, and oxygen disengaged from water at another.

Of this latter class one of the most interesting species is the *Aëpus fulvescens*, a minute carabideous insect found upon the shores of France and England, and whose economy has been traced by M. Victor Audouin in his " Observations sur un insecte qui passe une grande partie de sa vie sous la mer," published in the Nouvelles Annales du Museum d'Histoire Naturelle," Vol. iii. p. 117. This insect is not clothed with a coat of plush on its underside ; but when examined with a lens its head, thorax, legs, antennæ, and abdomen

are found to be furnished with long hairs ; and M. Audouin observes that when the insect is plunged into water each of these hairs " retient une petite couche du fluide élastique qui, réuni d'abord en petits sphéroides, forme bientôt un globule lequel entoure son corps de toutes parts et qui malgre l'agitation qu'il se donne en courant dans l'eau, au fond ou contre les parois du vase où on la placé ne s'echappe jamais." But this bubble of air is so small that, from the length of time that the insect remains submerged, it must soon become unfitted for respiration. And it is only by adopting the views of M. Dutrochet that we can explain the manner in which the Aëpus is enabled to remain beneath the surface of the water. M. Audouin has noticed the large ungues with which this insect is provided, enabling it to cling firmly to the stones, &c. amongst which it is found ; but in addition to these, the penultimate joint of the anterior tarsi is furnished with a long and curved bristle, meeting the ungues, which, together with the strongly developed jaws and under jaws, indicates very rapacious habits, the former being evidently serviceable in securing its prey. We can indeed easily perceive the necessity for activity in an insect situated, as the Aëpus must be, beneath the rolling tide, both in its ordinary motions, and in obtaining its supply of food.

In a subsequent note, published in the Annales des Sciences Naturelles, M. Audouin has pointed out the identity between this insect and the Cicindela marina of Strom, published in the Nouv. Memoires de la Société Royale de Danemark, for 1783.

Mr Spence, in a short memoir published in the third part of the Transactions of the Entomological Society of London, has collected notices from the Transactions of the Old Entomological Society and the British Entomology of Mr Curtis, of two other Coleopterous insects having similar habits, namely, Pogonus Burrellii, Haw. the habitation of which is entirely covered with water during the winter, and part of the summer months, and Bledius tricornis, which inhabits the sand hills near the sea at Cley in Norfolk.

In the Entomological Magazine, Number 7, April 1834, is contained an interesting memoir by the Rev. G. T. Rudd upon the habits of Hesperophilus arenarius and Dyschirius —? the former of which was observed by him in great flights settling on the sand below high-water mark. Mr Rudd inquires " what would become of the multitudes that dropped many yards below high-water mark, and burrowed in the sand? Would they again take wing? or would they perish as the flood covered their hiding place? I waited to see the event. The tide rolled on—covered the sands—with all their inhabitants—and again receded. I disturbed my friends from

their retreat—they were as lively as if they had been sporting in the sunshine, instead of having been under water for more than half an hour! One point was clear, (confirmed by repeated observations subsequently,) that these Brachelytrous insects have the power of enduring submersion and under salt water for at least half an hour. But why did they leave their burrows at a lower part of the sand? I had previously often collected on this spot, at different periods of the year, during the neap-tides, and on the most brilliant days, without having seen a single Hesperophilus on the wing. It is fair, therefore, to suppose either that the extraordinary flight I witnessed was a mere casual occurrence, or that, in some way or other, it is to be accounted for by the state of the tide. (It was the first of the spring tides.) On this latter supposition these insects must have been warned by some peculiar instinct to move higher up the sands, and thereby to avoid submersion for a period that probably would have exceeded their power of endurance."

Now the observations of MM. Dutrochet and Audouin, and the perfect analogy between the habits of the Hesperophili, Bledii, and Aëpus fulvescens, prove that the immersion of these insects was not a circumstance to which they were unused. And hence, I think, we must look for some other solution to the inquiry why these insects were on the wing in such swarms, than that suggested by Mr Rudd.

In a later number of the same work, (No. 18, January 1837,) Mr Haliday states that he found Cillenum laterale under stones near *low*-water mark. "They prey upon sandhoppers, (Talitrus Locusta, Leach.) The tide retiring has scarcely uncovered the sand when these little depredators are abroad from their hiding-places, and alert in the chase. A great part of their existence is passed under the sea, and the mode in which they obtain the necessary supply of oxygen during their prolonged submersion, when the small quantity in the air bubble which they convey with them is exhausted, seems to deserve a more particular investigation." As in Aëpus we find the mouth of this insect strongly developed, and the fore-legs are constructed in a peculiar manner, (somewhat analogous to those of Aëpus noticed above,) the upper edge of the tibial notch being furnished with two deflexed spines, between which the end of the moveable spine arising from the opposite angle is received. The spines attached to the basal joints of the anterior tarsi are also very strong. Thus the structure of this insect is equally adapted for its depredatory habits, whilst the strong bristles with which the limbs and body are furnished are similar to those of Aëpus. In company with the Cillenum, Mr Haliday discovered a new and

singular minute brachelytrous insect, which he has described under the name of Diglossa mersa, and in which the powerful structure of the tarsi, tarsal claws, and mandibles, as well as the ciliation of the legs, indicate a mode of life similar to that of Aëpus.

My friend, Dr Johnston of Berwick, whose investigations upon the submarine invertebrated animals have led him to explore the sea coast in his neighbourhood with so much success, has also met with the Aëpus near that town. And in the same situation he discovered several specimens of another brachelytrous insect, together with several small coleopterous larvæ and pupæ, which he has been so good as to place in my hands. These were all taken from under rocks within tide mark, fully 200 feet below high-water mark, and within 50 feet of low water mark, and where at each tide the rocks are covered for four hours or thereabouts.

The perfect insects in question prove to be undescribed, belonging to none of the genera hitherto established in the sub-family Omalides, to which they are referable. The very minute size of the elytra are quite characteristic of the insect, distinguishing it from all the other Omalides, in some of which the elytra nearly cover the abdomen, being of a larger size than usual in this group.

Genus, Micralymma,* Westw. (Plate IV.)

Corpus oblongum, depressum, lateribus abdominis marginatis. *Antennæ* mediocres, extrorsum crassiores. (Fig. 1 *e.*) *Palpi* maxillares articulo ultimo præcedenti longiori, elongato-conico. *Thorax* posticè angustior, capite paullo latior, lateribus rotundatis. *Elytra* minuta, segmentum primum abdominis vix tegentia. *Pedes* graciles. *Tibiæ* extrorsum inermes. *Tarsi* simplices, longè ciliati, articulis ultimis elongatis, reliquis simul sumptis æqualibus. (Fig. 1, *f.*) *Ungues* simplices, haud basi recurvati.

Structura oris.—Labrum transversum, margine antico ciliato et trilobato lobis fere æqualibus et rotundatis. (Fig. 1, *a.*) *Mandibulæ* elongato-trigonæ, acutæ, marginibus externis nonnihil arcuatis, setigeris, interno fere recto impressione sub apicem. (Fig. 1, *b.*) *Maxillæ* (Fig. 1, *c.*) elongatæ, curvatæ, bilobatæ, lobo interno gracili apice acuto intus setoso, externo majori sub apicem articulato. *Palpi maxillares* maxillis fere duplo longiores, 4-articulatæ, articulo 1mo brevissimo, 2do triplo longiori ad apicem crassiori, 3tio præcedenti duplo breviori, obconico; ultimo longitudine secundi elongato-conico. (Fig. 1. *g.*) *Mentum* transversum, antice paulo angustius, lateribus subrotundatis, angulis setâ longâ instructis. *Labium*

* Μικρὸς, parvus, et Καλυμμα, tegmen.

mento vix angustius, apice profundè emarginato et ciliato. *Palpi labiales* labio vix longiores 3-articulati, articulis magnitudine sensim decrescentibus. (Fig. 1, *d.*)

Species unica.

Micralymma Johnstonis, Westw. (Plate IV. Fig. 1.)

Tota nigra, subpubescens, haud nitida, sublævis.

Long. corp. 1½ lin.

Habitat in arenosis ad littora prope villam "Berwick-upon-Tweed" dictam.

In honorem Dominæ Johnstonis, rerum naturalium pictoris elegantissimæ uxoris Domini G. Johnstonis, et rerum maritimarum obscurarum naturæ scrutatoris eximii, indefessique.

This insect is most nearly allied to the genera Anthobium, Omalium and Coryphium. From all these, however, it is at once distinguished by the minute size of the elytra. In Anthobium, moreover, the body is broad and ovate; in Omalium the body is also much shorter and broader than in this insect; whilst in Coryphium the head is much broader than the thorax, and the palpi clavate. The trophi are not very different from those of Coprophilus (Elonium, Leach.)

In company with these insects were found specimens of the coleopterous larvæ and pupæ from which the accompanying sketches (Fig. 2 and 3) have been taken. The former (Fig. 2) is very long and narrrow, with an oblong flat head, armed with acute sickle-shaped jaws (Fig. 2, *m*,) having a single very strong external tooth about the middle of the interior margin. The maxillæ are represented by an elongated stem supporting two articulated lobes, the exterior four-articulated, the two basal joints very thick, and the two terminal joints slender, and the interior two-jointed, the joints of nearly equal length (Fig. 2, *mx*): the lower lip and its appendages (instrumenta labialia) are represented by a square basal joint supporting two thick detached cylindrical scapes, each terminated by a slender two-jointed palpus (Fig. 2, *l.*) The antennæ (Fig. 2, A) are four-jointed, the first, second, and fourth joints of nearly equal length, the third twice as long, and irregularly shaped, having a lateral appendage. These organs, as well as the different parts of the mouth, are furnished with long curved hairs. Eyes — ? Prothorax larger than the following joints, which are nearly equal in size, except the terminal one, which is smaller, and terminated by a cylindrical proleg, having on each side a slender two-articulated and setose filament. The legs (Fig. 2, *b*) consist of three pairs, attached in pairs to the three anterior segments of the body. Length of the larva a line and three-quarters.

The pupæ (Fig. 3 and 3 *a*) are small, broadly ovate, flattened, with the head concealed beneath the shield-like prothorax; the antennæ cases short; the legs arranged on the breast, not extending beyond the centre of the under side of the abdomen. The wing-cases are very short, not extending beyond the sides of the body; the front margin of the prothorax is furnished with two very long curved and several shorter bristles. The sides of the abdominal segments are also furnished with very long curved bristles, and this part of the body is terminated by two minute and narrow lobes.

It is unquestionable that both these larvæ and pupæ are those of a species of Staphylinidæ. The similarity of the former with the larvæ of several species of this family figured by myself in the Zoological Journal, and by Mr Waterhouse in the Transactions of the Entomological Society, Vol. i. leaves no doubt that this is the case with respect to the larva, whilst the minute size of the elytra and the shortness of the antennæ in the pupa, also prove that this is also brachelytrous. Hence I feel but little hesitation in regarding these larvæ and pupæ as those of Micralymma Johnstonis. In all these insects we see the same provision made for occasional respiration and abode beneath the surface of the water. The long hairs with which the legs of the imago are furnished, and the strength of the organs of the mouth, are analogous to what has been noticed in Æpus, whilst a reference to the figures, both of the larvæ and pupæ, will show that the same circumstances exist also in those states.

There still remain to be noticed some coleopterous insects, which, although unable to swim, reside at great depths beneath the surface of the water, although unprovided with the long hairs which we have seen are of so much service in Aëpus, &c. in retaining the globule of air. To these M. Audouin appears at first to have been inclined to apply the theory of M. Dutrochet, observing, "Je citerai encore plusieurs espèces de Coléoptères du genre Elmis, que l'on trouve sous les pierres au fond des ruisseaux et que jamais on n'a vu respirer l'air à leur surface. Il en *est* (a) *de même* des Dryops des Macroniques et des Georisses qui appartiennent à le même famille." It appears, however, that, in printing this memoir, the words "à quelques égards" were omitted at the place where I have placed (a). In the copy of this memoir, which the author was so kind as to send me shortly after it was printed, the equivalent words "à peu près" were introduced with a pen. This is the more requisite to be noticed, because my friend, M. Wesmael of Brussels, has attacked M. Audouin upon this point, observing, that, as the surface of the body in Elmis is unfurnished with long hairs, it is unable to retain a bubble of air, whilst on the underside there is observed on

each side a broad longitudinal band, contiguous to the lower margin of the Elytra, formed of a silky plush, which is most probably serviceable in retaining the necessary supply of air. The body of Parnus (Dryops) is entirely covered with this plush, but in Georyssus it is quite naked, and hence M. Wesmael thinks that it is not subaquatic, as supposed by M. Audouin, being, indeed, always found upon damp earth. (Annales Soc. Entomol. de France 1835, p. xl.) The genus Elmis and some others constitute a small tribe, which has been appropriately termed Macrodactyle, from the large size of the claws, which enable these insects to retain their stations in the most violent streams. I once found many specimens of several species of Elmis under stones in a mill stream, a yard and a half deep, close to the mill-wheel, where the water must have been constantly in agitation. The entire structure of these insects, and especially of the mouth, exhibits a striking contrast with that of Aëpus, &c, originating in the difference of their habits and motions, the Elmidæ feeding upon minute aquatic vegetable matter, and their movements being exceedingly slow.

The habits of the Enicoceri, as detailed in Mr Wailes' interesting paper in the Entomological Magazine, No. 3, are somewhat different from those of Elmis; but as I have not recent specimens of those insects, I am unable to institute an examination of the clothing of the body, &c. which would doubtless satisfactorily elucidate the cause of such difference.

IV.—*The Natural History of the British Entomostraca.* By William Baird, Surgeon, H. C. S. Plate V. (Continued from Vol. i. p. 526.)

Sp. III.—*Cypris strigata.* "Testa reniformi, fusca, fasciis tribus albis."

Habitat.—Pool on sea shore, a little above high water-mark, at Thornton Loch, East Lothian.

Synonimes.—Cypris strigata, *Muller*, Zool. Dan. prodrom. p. 199, No. 2387. 1776.

Cypris strigata *Muller*, Entomostraca, p. 54, tab. iv. fig. 4–6. 1785.

Monoc. strigatus, *Gmelin*, Lin. Syst Nat. 3002, No. 37. 1788.

M. strigatus, *Manuel*, Encyc. Method. Hist. Nat. Tom. vii. p. 726, No. 31. 1792.

M. strigatus, *Fabricius*, Entomol. system, Tom. ii. p. 496. 1793.

Cypris strigata, *Latreille*, Hist. Nat. gen. et part. des Crust. &c. Tom. iv. p. 245. 1802.

Cypris strigata, *Ramdohr*, Beyt. zur Naturg. einig. deut. Monoc. arten, pp. 14–17, tab. iv. fig. 1–14. 1805.

Mon. strigatus, *Rees'* Cyclopædia, Art. Monoculus. 1819.

Mon. bistrigatus? *Jurine*, Hist. des Monoc. p. 177, pl. 19, fig. 12–13. 1821.

Cypris strigata, *Desmarest*, Cons. Gen. sur les Crust. p. 386. 1825.

"Shell subovate, glabrous, ciliated at the margin, sublinear at aperture. Valves rather convex, brown, with three white fasciæ —the posterior one lunated, middle one oblique, anterior one arched —or, it may be described, valves white on dorsal margin, bound by a brown belt, with two oblique brown spots in the disc."—*Muller.*

Sp. IV. *Cypris vidua*, Plate V. Fig. 1. Testa subglobosa, fasciis tribus nigris transversis instructa.

Habitat. Pond at Greenwich. Canal at Rugby, Warwickshire.

Synonimes, Cypris vidua, *Muller*, Zool. Dan. prod. p. 199, No. 2384. 1776.
Cypris vidua, *Muller*, Entomost. p. 55, tab. iv. fig. 7–9. 1785.
Mon. vidua, *Gmelin*, Syst. Nat. 3002, No. 42. 1788.
Mon. vidua, *Manuel*, Encyc. Method. Hist. Nat. Tom. vii. p. 726, No. 36, pl. 264. f. 24–6. 1792.
Mon. viduatus, *Fabricius*, Entom. Syst. Tom. ii. p. 496. 1793.
Cypris vidua, *Latreille*, Hist. Nat. Gen. et Part. des Crust. &c. Tom. iv. p. 245. 1802.
Mon. vidua, *Rees'* Cyclopedia, Art. Monoculus. 1819.
Mon. vidua, *Jurine*, Hist. des Monoc. &c. p, 175, pl. 19, fig. 5–6. 1821.
Cypris vidua, *Desmarest*, Cons. Gen. sur les Crust. p. 385. 1825.

Neither the figure given by Muller, nor that by Jurine, is quite correct. The shell is of a somewhat globular form, a little sinuated on under margin; beset all round with dense, fine, short hairs; of a dull white colour, very distinctly marked by having three black, somewhat zig-zag fasciæ, running transversely across the shell, the most anterior of the three being the smallest. The posterior margin is rather narrower than the anterior, (though Muller makes it the contrary,) but not so much so as is represented by Jurine. Anterior feet provided with long filaments.

Sp. V. *Cypris Monacha*, Plate V. Fig. 2. Testa antice truncata, albo et nigro notata.

Habitat.—Old Canal near Rugby, Warwickshire.—Newham Loch, Northumberland.—*Dr Johnston.*

Synonimes, Cypris monacha, *Muller*, Zool. Dan. prod. p. 199, No. 2390. 1776.
Cypris Monacha, *Muller*, Entomostraca, p. 60, tab. v. fig. 6–8. 1785.
Monoc. Monachus, *Gmelin*, Syst. Nat. 3003, No. 44. 1788.
Mon. Monachus. *Manuel*, Encyc. Method. Hist. Nat. Tom. vii. p. 727, No. 41, pl. 266, f. 34–6. 1792.
Mon. Monachus, *Fabricius*, Entom. Syst. Tom. ii. p. 497. 1793.
Cypris Monacha, *Latreille*, Hist. Nat. Gen. et Part. des Crust. &c. Tom. iv. p. 247. 1802.
Monoc. Monachus, *Rees'* Cyclop. Art. Monoculus. 1819
Monoc. Monachus, *Jurine*, Hist. des Monocles, &c. p. 173, pl. 18, f. 13–14. 1821.
Cypris Monacha, *Desmarest*, Cons. Gen. sur les Crust. p. 384, pl. 55, f. 7. 1825.

The figure given by Muller is much better than that of Jurine. Shell somewhat of a rhomboidal form; rounded at posterior, and truncated as it were at anterior margin; glabrous, with a few hairs on posterior margin; surface of shell as it were reticulated, or, as Muller says, marked with small points impressed into, or as it were excavated out of shell. Upper part of shell is nearly of a white colour; lower portion, anterior margin, and part of posterior one, of a black colour, shaded with a yellowish green; filaments of anterior feet long. A very pretty and well-marked species.

Sp. VI. *Cypris Candida.*—Plate V. Fig. 3. Testa subovata, candidissima, lucenti.

Habitat.—Berwickshire; Roxburghshire; neighbourhood of London, &c. common.

Synonimes, &c.—Poisson nommé Deteuche, *Joblot*, Observ. d'Hist. Nat. faites avec le Micros. part 2, p. 104, pl. xiii. fig. 0. 1754.

Cypris Candida, *Muller*, Zoolog. Dan. prodrom. p. 199, No. 2385. 1776.

Cypris Candida, *Do.* Entomostraca, p. 62, tab. vi. fig. 7–9. 1785.

Monoc. Candidus, *Gmelin*, Lin. Syst. Nat. 3002, No. 40. 1788.

Mon. Candidus, *Manuel*, Encyc. Method. Hist. Nat. Tom. vii. p. 726, No. 34. 1792.

Monoc. Candidus, *Fabricius*, Entomol. Syst. Tom. ii. p. 497. 1793.

Cypris Candida, *Latreille*, Hist. Nat. Gen. et Part. des Crust. &c. Tom. iv. p. 248. 1802.

Mon. Candidus, *Rees'* Cyclopedia, Art. Monoculus. 1819.

Mon. Candidus, *Jurine*, Hist. des Monocles, &c. p. 176, pl. 19, fig. 7–8. 1821.

Cypris Candida, *Desmarest*, Consid. Gen. sur les Crust. p. 385. 1825.

Cypris lucens, *Baird*, Trans. Berw. Nat. Club, p. 100, pl. iii. fig. 15. 1835.

The figure given by Joblot, referred to above, appears to me to be undoubtedly the *Candida*, though, curiously enough, Muller himself refers it to his *pubera*, while Straus again refers it to his *fusca*. The figure given by Muller is not good, that of Jurine is much better. The shell is smooth and shining, but fringed round the margins with fine hairs of a pure white-colour, with a pearly lustre, nearly opaque, ventricose: anterior extremity narrower and flatter than posterior, which is arched; upper margin raised, lower somewhat reniform; filaments of anterior feet consist of only three or four short hairs; animal generally creeps near the bottom of the vessel in which it is kept.

Sp. VII. *Cypris fusca.*—Plate V. Fig. 4. Testa ovata, reniformi, fusca.

Habitat. Neighbourhood of London.

Synonimes. Cypris fusca, *Straus*, Mem. de Mus. d'Hist. Nat. Tom. vii. pl. i. fig. 16. 1821.

Cypris fusca, *Desmarest*, Cons. Gen. sur les Crust. p. 384. 1825.

Shell oval; of a brown-colour, reniform; anterior extremity narrower than posterior, which is rounded and broad; shell covered with fine hairs; anterior feet provided with three long filaments; the rounded posterior extremity and brown-colour sufficiently distinguish this species from Muller's *Candida*.

Sp. VIII. *Cypris reptans*.—Plate V. Fig. 5. Testa elongata, stricta, maculis magnis viridibus notata.

Habitat.—Yetholm Loch, Roxburghshire.—Newham Loch, Northumberland, *Dr Johnston*. New river, London.

Synonimes—Cypris reptans, *Baird*, Trans. Berw. Nat. Club, p. 99, pl. iii. fig. 11.

"Shell long, narrow, almost elliptical, nearly plane on upper, and slightly sinuated on under margin; rather ventricose; hairy; densely ciliated on anterior extremity; the ciliæ on posterior extremity fewer, but much longer; of a light colour, with dark-green markings, which appear to be rather irregular; both extremities have a large broad green spot, which send out processes as it were towards the centre of shell; antennæ and feet short in comparison with size of shell. I have never seen this species swimming about in the vessel in which I have kept it, but always creeping on the bottom,"—hence its name.—Filaments of anterior feet few and very short.

Sp. IX. *Cypris hispida*.—Plate V. Fig. 6. Testa ovata, fusca, hispida.

Habitat.—At Yetholm, Roxburghshire. Ditch near Surrey Zoological Gardens, London.

Synonimes—Cypris hispida, *Baird*, Trans. Berw. Nat. Club, p. 99, pl. iii. fig. 14.

"Shell almost elliptical; anterior extremity a little broader than porterior; rather ventricose; very roughly and densely hairy; of a brown-colour all over, with one or two dark brown marks running across the centre of shell; both extremities of a darker colour than other parts of shell; the whole shell is very hispid, spines rather than hairs covering the shell; antennæ slender; setæ seldom much divaricated." Filaments of anterior feet, if any, consist only of two or three short hairs, as in *Candida* and *Reptans*; and like them, this insect is generally to be found at the bottom of the vessel in which it is kept. This circumstance would seem to favour Jurine's opinion of the important use the anterior feet serve for progressive

motion, as we seldom see those species which have not the filaments long so active in swimming as the others.

Sp. X. *Cypris Compressa.*—Plate V. Fig. 7. Testa plano-rotundata, fusco-grisea, compressa.

Habitat. Yetholm Loch, Roxburghshire; Rugby, Warwickshire; neighbourhood of London, very common.

Synonimes. Cypris Compressa, *Baird*, Trans. Berw. Nat. Club, p. 100, pl. iii. fig. 16.

"Shell round-shaped, compressed, rather narrower anteriorly than posteriorly; of a brownish gray colour more or less deep; semitransparent; at either extremity beset with fine hairs—in general the surface of the shell is spotted, as if little pieces were hollowed out of it. Anterior feet provided with three long filaments; eye large; from the flat compressed shape of shell, its motion through the water is very much like that of some species of Lynceus."

Sp. XI. *Cypris minuta.*—Plate V. Fig. 11. Testa ovato-globosa, sub-fusca, parva.

Habitat. At Yetholm, Roxburghshire; Pond near Copenhagen Fields, London.

Synonimes. Cypris minuta, *Baird*, Trans. Berw. Nat. Club. p. 99, pl. iii. f. 9. Monoculus ovum? *Jurine*, Hist. des Monocles, &c. p. 179, pl. 19. f. 18–19.

"Shell broader posteriorly than anteriorly; elevated and rounded on upper margin; slightly sinuated on under margin; hairy all around; of a light brown colour with a tinge of green; body of shell smooth, shining; anterior feet furnished with a pencil of long filaments." This is the smallest of all the species I have met with, and approaches very near to the *Mon. ovum* of Jurine, except that he says his species is perfectly smooth, whereas this one is beset densely all around shell with short hairs.

Sp. XII. *Cypris Joanna.*—Plate V. Fig. 12. Testa ovato-globosa, fusca, hirta.

Habitat. Pool at Abbey St Bathans, Berwickshire.

Synon. Cypris Joanna, *Baird*, Trans. Berw. Nat. Club, p. 99, pl. iii. fig. 8.

"Shell roundish-ovate; narrower anteriorly than posteriorly; of a brown colour, with an orange mark across back of shell and lower margin; shell beset all round with rigid hairs, and covered with minute black points or dots; setæ of antennæ numerous. Differs from Cypris pilosa, Muller, in smaller size, orange mark across shell, and in not being glabrous, but marked all over with black roughish-looking points." A little larger than *C. minuta*.

Sp. XIII. *Cypris elongata.*—Plate V. Fig. 13. Testa alba, cuneiforme, elongata.

Habitat. Yetholm, Roxburghshire.

Synon. Cypris elongata, Baird, Trans. Berw. Nat. Club, p. 99, pl. iii. f. 10.

"Shell much broader at anterior than posterior extremity, which is narrow and much elongated; elevated on upper margin towards anterior extremity, and sinuated on under margin more towards the posterior extremity: white; transparent; hairy; setæ of antennæ five or six; anterior feet furnished with setæ."

Sp. XIV. *Cypris Westwoodii.*—Plate V. Fig. 14. Testa reniformi, viride, conica.

Habitat. Yetholm Loch, Roxburghshire.

Synon. Cypris Westwoodii, *Baird*, Trans. Berw. Nat. Club, p. 99, pl. iii. f. 12.

"Shell much elevated and rounded on upper margin, and reniform on under—a little broader at anterior extremity; green coloured; semitransparent; densely covered with pretty long hairs all over; second last joint of anterior feet furnished with a pencil of long hairs; posterior feet furnished with a setæ at each articulation."

Sp. XV. *Cypris gibbosa.*—Plate V. Fig. 15. Testa rotundo-ovata; reniformi, gibbosa.

Habitat. Ditch near Surrey Zoological gardens, London.

Shell roundish ovate: elevated on upper margin, with a gibbosity or hump; reniform on under margin; body of shell smooth, of a light-green colour, paler on anterior extremity; beset with short fine hairs all round the edges of shell; nearly opaque; filaments of antennæ and anterior feet beautifully plumose. Double the size of *C. Westwoodii*, to which it approaches somewhat in shape of shell.

Sp. XVI. *Cypris clavata.*—Plate V. Fig. 16.* Testa oblonga, clavata, lævi.

Habitat. Pond near Copenhagen Fields, London.

Body of shell smooth and shining, but beset round margin with short hairs; of a light grey colour, with an obscure dark-coloured ray running from centre towards posterior extremity, which again is distinctly marked with an orange-coloured spot, oblong, narrower at posterior than anterior extremity, which is rather flattened, middle of valves ventricose; antennæ and feet rather short in comparison with size of shell, filaments of both plumose. This species ap-

proaches near to *Cypris crassa*, Muller, in his description of that species, but differs *in toto* from the figure which he gives of it.

A species of fossil Cypris occurs in the limestone of Burdiehouse quarry, near Edinburgh, but which I have not had opportunities of sufficiently examining.

2d Genus, Cythere.

Bibliographical History.—Otho Fridericus Muller is the first naturalist that has taken notice of this genus of insects. Before his time they were perfectly unknown, not the slightest mention of their existence having been made by any previous writer. As it is to him that we are indebted for the first information, so it is to him alone that we owe all that we do know, with the exception, I believe, of what few additional particulars will be found in the following pages. Upon a slight inspection, the *Cytheres* might be mistaken for *Cyprides*; but their antennæ being simple, and free from the pencil of long hairs with which these organs in the *Cypris* are endowed; their possessing eight feet; the want of the long tail, and their inhabiting salt water, sufficiently distinguish the two genera. It is in his "Entomostraca" that Muller first established this genus, and the above marks of distinction between it and the *Cypris*, constitute almost all the knowledge that he imparts to us concerning it. Meager as it is in details, it has not been enlarged by any succeeding author. Gmelin, in the "Systema Naturæ," 1788; Fabricius in his "Entomologia Systematica," 1793; Manuel in the "Encyclopedie Methodique," 1792; and Latreille in his "Hist. Nat. Gen. et Part. des Crustacés," &c. 1802; either merely give the species alone, or repeat the few remarks made by Muller, without making any comment or original observations of their own. Lamarck, in his "Hist. Nat. des Animaux sans Vertebres," 1818, changes Muller's name, and gives the genus the appellation of *Cytherina*; while Desmarest, in his "Consid. Gen. sur les Crustacés," 1825, in repeating the observations made by Muller, and giving merely his species, adds, that it may turn out that some of the eight feet may be particular organs, and that the number of true feet may be found to be the same as in the *Cypris*, a conjecture which Latreille also makes in the last edition of "Cuvier's Règne Animal," 1829. Desmarest moreover says, "reasoning from analogy, there is reason to believe that the *Cytheres* like the *Cyprides* have their branchial plates attached to the mandibles and jaws, and that their feet are

solely destined for locomotion."* In both these suppositions we shall find he is quite correct.

Anatomy.—The shell in almost every respect strictly resembles that of the *Cypris*, but from their general opacity and minuteness, it is exceedingly difficult to examine with precision the body of the inclosed animal. After repeated attempts, however, to break down the horny opaque shell, I succeeded so far as to discover that, like the *Cypris*, the body of the insect is divided into two parts, connected with each other by a narrow space, the anterior half containing the eye, antennæ, anterior feet, organs of mouth, and two pairs of intermediate feet; the posterior half containing the posterior feet, and a short appendix or tail. The eye resembles in appearance and situation that of the *Cypris*, being single, fixed, and in the form of a black sessile point. Antennæ two, (Plate V. Fig. 16. *a*, *a*. Fig. 18.) composed each of five articulations, furnished with one or two short setæ at the base of each of the three last articulations, and terminated by three or four rather longer hairs at the extremity of the last joint, differing very much in this respect from the same organs in the *Cypris*. As the *Cythere* has never been seen to swim, these organs may be thus considered as true antennæ. The feet are decidedly eight in number; the anterior pair are inserted immediately beneath the antennæ, and are by far the strongest of all, (Plate V. Fig. 16., *b*. *b*. Fig. 19.) They differ in shape from the other pairs, being flatter and falcated in appearance. They consist of four articulations; the first and third being very short. The last gives off from internal edge three spines, and is terminated by two or three short hooks as in the *Cypris*, while from the base of the second joint there springs a long stiff seta, equalling in length the two last joints, and being divided into three articulations, of which the middle is the longest. This seta is mentioned by Muller as occurring in his *Cythere lutea*, but is taken notice of by him as being peculiar to it, or at least as not having been seen in any other species. It occurs, however, in all I have examined, and seems to take the place of the pencil of long hairs that is to be found on the penultimate joint of the corresponding pair of feet in the genus *Cypris*, but the precise use of which I do not understand. The three other pairs of feet (Plate V. Fig. 16, *c*. Fig. 20.) are exactly like each other, except in length; they are round and slender, and consist each of four articulations, the first of which is the largest, and gives off a short spine at its base; the last is the shortest, and is terminated by a long curved hook. The first or anterior pair are, as in the *Cyprides*, di-

* P. 387.

rected backwards, whilst the other three are directed forwards. The first of these three pairs are very short, the second a little longer, whilst the third or last pair are the longest of all, being longer than the anterior pair, though much more slender. This last or posterior pair appears to arise from near the junction of the two halves of the body, and may supply, as Muller says, the want of the tail. The mouth is situated in the inferior surface of the anterior half of the body, as in the *Cypris*, and appears to consist of exactly the same organs as in the insects of that genus, though from their extreme minuteness, and want of lengthened opportunities for examination, I have not been able to make out all the parts. The palpiferous mandibles, and the first pair of jaws with their branchial plates, are the only parts I have been able clearly to make out, and they resemble in almost every respect the corresponding organs of the *Cyprides*. The mandible (Plate V. Fig. 21.) is formed of two pieces, the larger of the two, or proper mandible, as in the *Cypris*, being terminated at the superior extremity by a sharp point, and at the lower or incisive extremity by about six pretty strong teeth, while the other part or palpus consists of three joints plentifully supplied at the extremities of the articulations with numerous setæ. I failed, however, in making out the small branchial plate which occurs in this organ in the *Cypris*. The first pair of jaws, (Plate V. Fig. 22.) as in the *Cypris*, consists also of two parts; the square plate with the four fingers, (Fig. 22, *a*.) the superior of which has two joints, whilst the others have only one, and all terminated by a tuft of hairs; and the branchial plate (Fig. 22, *b*.) attached, of an elongated oval form, furnished with fourteen long setæ, which are given off from both sides. As these organs are so very similar to the corresponding organs in the *Cypris*, I have no doubt that the other parts (the lips and second pair of jaws) are also the same, and that therefore the supposition of Desmarest with respect to some of the intermediate feet being *particular organs* is incorrect; and that, as their use and situation indicate, they are all true feet, and used solely for locomotion; the posterior or fourth pair perhaps serving in addition one of the uses of the tail, that of cleaning the inside of the shell, for which they are well calculated from their length, and the great degree of mobility they possess. The appendix or short tail is of such an irregular figure, that, until better opportunities occur for examination, I shall not attempt a minute description. The internal anatomy I have not been able to make out at all; neither have I ever seen any individuals with ova, though this may be ac-

counted for from the specimens which I have examined being dissected in the winter months.

Habits and Manners.—These insects are only to be found in sea water, and may be met with in all the little pools amongst the rocks on the sea shores. They live amongst the fuci and confervæ, &c. which are to be found in such pools; and the naturalist may especially find them in abundance in those beautiful clear little round wells which are so often to be met with hollowed out of the rocks on the shores of our country, which are within reach of the tide, and the water of which is kept sweet and wholesome, by being thus changed twice during every twenty-four hours. In such delightful little pools, clear as crystal when left undisturbed by the receding tide, these interesting little creatures may be found often in great numbers sporting about amongst the confervæ and corallines, which so elegantly and fancifully fringe their edges and decorate their sides,—and which form such a glorious subaqueous forest for myriads of living creatures to disport themselves in. Sheltered amongst the "umbrageous multitude" of stems and branches, and nestling in security in their forest glades, they are safe from the fury of the advancing tide, though lashed up to thunder by the opposing rocks which for a moment check its advance; and weak and powerless though such pigmies seem to be, they are yet found as numerous and active in their little wells, after the shores have been desolated by the mighty force of the tide which has been driven in, in thunder, by the power of a fierce tempest, as when the waves have rolled gently and calmly to the shore in their sweetest murmurs. These insects have never been seen to swim, invariably walking amongst the branches or leaves of the confervæ or fuci—amongst which they delight to dwell; and when shook out from their hiding-places into a bottle or tumbler of water they may be seen to fall in gyrations to the bottom, without ever attempting to dart through the watery element, as in the case with the *Cyprides*. Upon reaching the bottom, they open their shells and creep along the surface of the glass; but when touched or shook they immediately again withdraw themselves within their shell and remain motionless. This inability to swim is no doubt owing to the want of the pencils of long hairs or filaments which adorn the antennæ and anterior part of the *Cyprides*, and which we have already seen are the organs by means of which they swim through the watery element in which they live. My opportunities for observing these insects have been so limited, and the difficulty of keeping them alive, from the rapidity with which sea water becomes putrid when kept in a room in a small vessel, is

so great, that I cannot say any thing further with regard to their economy or habits. The species, however, I have no doubt, are numerous, and the labours of any inquirer after them would, I have no doubt, be soon rewarded with great success.

Species.

Sp. I. *Cythere flavida.*—" Testa oblonga, glabra." Muller.

Habitat. Amongst confervæ in pools of sea water amongst the rocks on the shore at Cockburnspath, Berwickshire.

Synonymes. Cythere flavida, *Muller*, Entomost. p. 66, tab. vii. fig. 5–6. 1785.

Monoculus flavidus, *Gmelin*, Syst. Nat. 3001, No. 33. 1788.

Mon. flavidus, *Manuel*, Encyc. Method. Tom. vii. p. 725, No. 27, pl. 266, f. 10–11. 1792.

Mon. flavidus, *Fabricius*, Tom. ii. p. 494. 1793.

Cythere flavida, *Latreille*, Hist. Nat. &c. Tom. iv. p. 253. 1802.

Mon. flavidus, *Rees'* Cyclop. Art. Monoculus. 1819.

Cythere flavida, *Desmarest*, Consid. Gen. &c. 1825.

" Shell oblong, of a yellowish colour, smooth, obtuse at each extremity, narrower anteriorly; antennæ scarcely setiferous." Muller.

Sp. II. *Cythere reniformis.*—Plate V. Fig. 16–22. Testa reniformi, hirta, valvulis crusta calcarea obductis.

Habitat. Coast of Berwickshire, common.

Synon. Cythere reniformis, *Baird*, Trans. Berw. Nat. Club, p. 98, pl. iii. fig. 5.

Shell reniform, rough with hairs; both extremities of nearly equal size; anterior extremity a little flatter than posterior. Centre of valves covered with a calcareous-looking crust, which is of rather a darker colour than rest of shell, and appears studded all over with short spines; colour of shell a light brownish yellow. It approaches the *Cythera lutea* of Muller in shape, but differs somewhat in colour, in being roughly hairy, and having the valves covered with the hard crust.

Sp. III. *Cythere albo-maculata.*—Plate V. Fig. 23. Testa oblonga, sinuata, valvulis crusta calcarea albo-maculata obductis.

Habitat. Berwick Bay—not very common.

Shell oblong, a little flatter at anterior extremity; slightly rounded on upper margin, and deeply sinuated on lower, near anterior extremity. Each extremity and lower margin densely hairy; middle portion of valves covered with a calcareous-looking crust, as in last species, which is studded all over with short spines, except where it is marked with two white smooth shining spots of considerable size. Shell altogether of a dull-brown colour.

Sp. IV. *Cythere alba.*—Plate V. Fig. 24. Testa alba, translucida, obovata.

Habitat. Sea-shore at Dunbar, East Lothian.

Syn. Cythere alba, *Baird*, Trans. Berw. Nat. Club, p. 98, pl. iii. fig. 6.

Shell white, transparent, showing the dark body of insect through it; hairy round edges; acute at posterior extremity, and broader at anterior; a margin round the outer edge of the shell whiter than the rest. Having only once met with this curious species, and an accident happening to the vessel in which it was kept, I am unfortunately unable to give a fuller description of it.

Sp. V. *Cythere variabilis.*—Plate V. Fig. 25, *a b.* Testa ovale, glauca, glabra.

Habitat. Coast of Berwickshire, common.

Syn. Cythere variabilis, *Baird*, Trans. Berw. Nat. Club, p. 98, pl. iii. fig. 7, *a.b.*

Shell glaucous, without any hairs, perfectly oval-shaped, anterior extremity narrower than posterior; anterior legs falcate, and furnished with pretty strong claws; antennæ slender, without setæ. This species varies much in colour, and markings; some specimens are white, with two black fasciæ running transversely across shell, one at posterior margin, the other across the centre of the shell, while the posterior extremity is marked besides by a beautiful reddish or bright bronze spot. (Fig. 25, *a.*) Other specimens are of a light flesh-colour, with the edges of shell slightly greenish, and the body of shell marked with dark streaks running across. Some are altogether of a fine flesh-colour, without any marks upon the shell, while others again are of a uniform dark-brown or almost black. (Fig. 25, *b.*) All the varieties, however, agree in shape of shell, in size, &c. merely differing in colour and marks.

Sp. VI. *Cythere aurantia.*—Plate V. Fig. 26. Testa ovata, reniformi, glabra, aurantia.

Habitat. Berwick-Bay, not uncommon.

Shell rounded and rather prominent on upper margin; slightly reniform on under; rather broader posteriorly than anteriorly; smooth, glaucous, of a bright orange-colour; very minute in size; antennæ setiferous; anterior feet falcated.

Sp. VII. *Cythere nigrescens.*—Plate V. Fig. 27. Testa extremitate postrema acuminata, glabra, sub-nigra.

Habitat. Berwick-Bay, not uncommon.

Shell rounded on upper margin and anteriorly; terminating posteriorly in an acute point, with a gibbous projection on the lower margin, near posterior extremity; shell quite smooth and free from hairs, of a dirty black-colour, translucent, showing the body of the animal shining through, which is very dark-coloured; antennæ setiferous; anterior feet falcated.

Explanation of Plates.

Plate XVI. Vol. I. Fig. 1 to 13, Body of Cypris pubera; the shell removed; *a.* anterior lobe; *b.* posterior lobe; *c.* eyes; *d.* antennæ; *e. e.* anterior or first pair of feet; *f. f.* second pair of feet; *g.* third pair; *h.* mandible and palpus; *i.* first pair of jaws with branchial plate; *k.* tail. Fig. 2, one of the antennæ. Fig. 3, one of the anterior legs. Fig. 4, one of the second pair do. Fig. 5, one of the third pair. Fig. 6, the lip (*a*) and sternum or lower lip (*b.*) Fig. 7, mandible; *a.* mandible proper; *b.* palpus; *c.* small branchial plate. Fig. 8, first pair of jaws; *a.* base, with its fingers; *b.* branchial plate with its pectiniform spines. Fig. 9, second pair of jaws. Fig. 10, tail. Fig. 11, egg. Fig. 12, young. Fig. 13, adult Cypris pubera.

Plate V. Vol. II. Fig. 1, Cypris vidua. Fig. 2, C. Monacha. Fig. 3, C. Candida. Fig. 4, C. fusca. Fig. 5, C. reptans. Fig. 6, C. hispida. Fig. 7, C. Compressa. Fig. 8, one of the antennæ of C. Compressa. Fig. 9, one of the anterior feet of do. Fig. 10, one of the third pair of feet of do. Fig. 11, C. minuta. Fig. 12, C. Joanna. Fig. 13, C. elongata. Fig. 14, C. Westwoodii. Fig. 15, C. gibbosa. Fig. 16, * C. clavata. Fig. 16, Body of Cythere reniformis, the shell removed. Fig. 17, Cythere reniformis. Fig. 18, one of the antennæ of do. Fig. 19, one of the anterior feet of do. Fig. 20, one of the posterior pair of feet of do. Fig. 21, mandible. Fig. 22, first pair of jaws. Fig. 23, Cythere albo-maculata. Fig. 24, C. alba. Fig. 25, C. variabilis, *a.* and *b.* Fig. 26, C. aurantia. Fig. 27, C. nigrescens.

(To be continued.)

V.—*Directions for the preservation of Sea Plants, with Miscellaneous Remarks on a number of species collected at Cairnlough Bay, on the Coast of Antrim, in the months of May and June* 1836. By James S. Drummond, M. D. President of the Belfast Natural History Society, &c.

The first object to be attended to in preserving marine plants is to have them washed perfectly clean before spreading. There should not be left upon them a particle of sand or other foreign body, unless

in some rare instances a parasitic species may be thought worthy of keeping, on account of its rarity, or because it may add an additional beauty to the chief specimen. It is a good practice to wash them before leaving the shore either in the sea, or in a rocky pool, or, as is sometimes more convenient in some localities, in a rivulet discharging itself into the ocean, though, as will be afterwards explained, the last practice proves very destructive to the beauty of some species.

The foreign bodies to be got rid of are fragments of decayed sea-weeds, sand, gravel, and sometimes portions of the softened surface of sandstone or argillaceous rock on which the specimens may have grown, together with the smaller testacea, and the *Corallina officinalis*, &c. At Cairnlough Bay I experienced most trouble in this respect from the *Ectocarpi*, which confervæ were so generally diffused, as to be entangled with almost every other species of sea-plant.

After the greatest pains which we may take to clean our specimens at the shore, there will generally be found much to do before they can be properly committed to paper, since foreign substances will continue attached to them with much pertinacity even after we may have been satisfied that they are perfectly clean. It is therefore necessary to prepare each specimen by examining it in fresh or sea water in a white dish or plate, so that every thing foreign may be detected and removed.

The next thing to be attended to is the quality of the paper on which the specimens are to be spread; and here a great error is generally committed, in using it thin and inferior, by which, if the specimen be worth preserving, it has not proper justice done to it. Much of the beauty, indeed, of many species depends on the goodness of the paper, exactly as a print or drawing will appear better or worse, as it is executed on paper of a good or an inferior kind. Some species, too, contract so much in drying as to pucker the edges of the paper, if it be not sufficiently thick, for example *Delesseria laciniata*, and this has a very unsightly appearance. That which I have from experience been led to prefer is a thick music-paper. It closely resembles that used for drawing, and the sheet divides into four leaves, of a most convenient size, each being about an inch and a-half longer and broader than a leaf of this Magazine. These, again, divided into halves answer for small species, and for large specimens we may use the entire folio. We have thus three regular sizes of paper, and this serves to give a uniformity and neatness to a collection not to be obtained by using papers at random, and of casual dimensions.

Whatever pains we may have taken to clean the recent specimens, we shall often find, when spreading them, that some foreign particles

continue attached, and for the removal of these a pair of dissecting forceps, and a camel hair pencil of middle size, will be found very convenient. These, indeed, are almost indispensable, and will be found useful on more occasions than can here be specified. A silver probe, with a blunt and a sharp end, is the most convenient instrument for spreading out, and separating branches from each other, but any thing with a rigid point, such as a large needle, or the handle of the camel-hair pencil sharpened, will answer. A large white dinner-dish serves perfectly well for spreading the specimens in, and all that is farther necessary is a quantity of drying papers, and some sheets of blotting-paper, with three or four flat pieces of deal-board. Nothing answers better for drying than old newspapers, each divided into eight parts, but it is necessary to have a large supply of these.

The beautiful and common *Plocamium coccineum* is one of the most easily preserved species, and may be taken as an example of the mode of proceeding with most of the others. The steps to be pursued are as follows,—

1. The specimen is to be perfectly well cleaned.

2. A dinner-dish to be filled about two-thirds with clean fresh water.

3. The paper on which the specimen is to be spread, to be immersed in the water in the dish.

4. The specimen to be then placed on the paper, and spread out by means of the probe and camel-hair pencil.

5. The paper with the specimen on it to be then slowly withdrawn from the dish, sliding it over its edge.

6. The paper with the specimen adhering to it, to be held up by one corner for a minute or two, to drain off the water.

7. To be then laid on a paper, or cloth, upon a table, and the superfluous water still remaining to be removed by repeated pressure of blotting-paper upon the specimen, beginning this operation at the edges, and gradually encroaching towards the centre till the whole can be pressed upon without danger of any part adhering to the blotting-paper, which probably would be the case, were the latter applied at once to the whole specimen.

8. The specimen then to be laid on a couple of drying papers placed on the carpet or a table; two more papers to be laid *over* it, and then the piece of board, on which latter a few books are to be put, to give the necessary pressure.

9. These papers to be changed every half hour or oftener, till the specimen is sufficiently dry. (A number of specimens with drying papers interposed, may be pressed at once under the same board.)

Though the above method is in general the best, yet there are various species, and among these the *Plocamium coccineum* itself, which dry perfectly well by simple exposure to the open air without pressure being had recourse to at all; and some can only be preserved in the latter way, being so glutinous that they will adhere as strongly to the drying paper laid over them as to that on which they are spread. Pressure, however, is necessary after they have dried, for the purpose of flattening them.*

After these general remarks, I will now offer some observations relating to several genera and species, following the order in which they are arranged in the English Flora.

I believe all the species belonging to the Fucoideæ are to be dried in the manner of land plants, after having been previously steeped for some time in fresh water to extract their salt and mucilage. *Cystoseira granulata*, which I have repeatedly found on the Larne shore, will adhere imperfectly if spread in water, but it is best treated as a land plant, to be afterwards fixed with mucilage. *Halidrys siliquosa*, *Fucus vesiculosus*, and *F. nodosus* require very heavy pressure. The air-vesicles of the first may be in part cut longitudinally to show the internal partitions, and of the two last, to diminish their diameter, but this must be done *after* they are dried, for if done in the recent state they contract and become disfigured.

Himanthalia lorea.—Very common on the Antrim coast. It is observed in the English Flora, that the peziza-shaped fronds of this species have been observed "on exposed rocks in the Orkneys swollen into a large hollow, exactly spherical, smooth black ball, probably in consequence of the heat of the sun rarifying and expanding the air within." I have seen them this summer in a similarly inflated state, not on exposed rocks, but in pools of water where they could never have been uncovered; they were not black, but of a bright yellow colour, and looked exactly like a parcel of hard-boiled yolks of eggs. I suspect this inflation to be the effect of disease.

Alaria esculenta.—Common on the Antrim coast. Adheres very well to paper when young, more imperfectly when old. It becomes

* An indispensable requisite in the drying of marine or fresh water algæ is a portion of old rag, neither of a quality too fine or too coarse. When the specimen has been spread, as directed, upon the paper on which it is to remain, a piece of rag sufficient to cover it should be laid over, and then it may be interleaved under the boards for pressure. The rag prevents the necessity of so much care in taking up the moisture as Mr Drummond requires, never adheres to the specimens, but when dry, leaves them, while most of the plants themselves stick firmly to the sheets on which they have been spread.—Eds.

very transparent in drying, and is a great ornament to the herbarium. In the north of Ireland it is called *murlins*, and is often gathered for eating, but the part used is the leaflets, and not the midrib, as is commonly stated. These have a very pleasant taste and flavour, but soon cover the roof of the mouth with a tenacious greenish crust, which causes a sensation somewhat like that of the fat of a heart or kidney. These leaflets or *pinnæ* are quite membranaceous when young, but in full-grown plants are fleshy, and at their middle a quarter of an inch or more in thickness. Some of my specimens are of a fine light-green colour, others mottled with rich brown, and some are of a golden-yellow. Young specimens in general are of a uniform colour throughout.

Laminaria digitata.—This common plant is highly prized on many parts of the Antrim coast as a manure. Every kind, indeed, that is thrown up is used for the same purpose, and in some places it is a common saying, that a sack of sea-wrack will produce a sack of potatoes. After a fresh in-blowing wind, I have seen Cairnlough Bay almost as populous as a fair, from the number of persons that had collected from several miles around with horses and cars to carry off the wrack. In calm or moderate weather the inhabitants of the coast wade in amongst the rocks at low-water with reaping-hooks, and cut away the *F. vesiculosus* and *nodosus* with the same object. They often also go out in boats, and cut the tangle with crooked knives fastened to the end of long poles, by which large quantities are obtained. On parts of the shore which are too rugged for a wheeled vehicle, the wrack is carried off in creels attached to the backs of ponies, and where these cannot have access, both men and women may be seen toiling from the shore with bagfuls on their backs, or basketfuls on their shoulders. An almost universal opinion prevails, not only at Cairnlough, but on every part of the coast, so far as I have been informed, that a much larger quantity of wrack is thrown ashore during rain than at other times. I inquired from many farmers, and from gentlemen living on the coast, respecting this, and they all considered it a thing perfectly ascertained. I first heard this opinion some years ago from a friend who lives at Donaghadee, in the county of Down, who stated, that it was quite a common thing for farmers in that neighbourhood to yoke their horses, and go to the beach for wrack as soon as rainy weather came, though, allowing the wind to be the same, they would not think of doing so if the weather were dry, thinking that this trouble would be useless. I have had a precisely similar account from a gentleman in the neighbourhood of Carrickfergus; but yet with all this evidence I have not been able,

from my own observation, to find the least colour for believing that there is any truth in the assertion, though I am puzzled to account for the prevalence of the opinion in places so distant from each other. That there may occasionally be the *appearance* of more wrack on the shore during rain it is easy to conceive, as plants which are thrown high up during a spring tide in dry weather may continue beyond the reach of the sea-water, shrivelled up, but on the coming of rain will expand and make a show, when before they were undistinguishable; but it can scarcely be supposed that this forms the foundation of the opinion I have mentioned.

The desire to procure wrack at Cairnlough has increased much of late years, in proportion as its utility has become better known; and I have at times been somewhat inclined to suspect that cutting the tangle in such quantities as is done, may have had some influence in diminishing the number of fishes in the bay, which are every year becoming more and more scarce, so that where they used to be plentiful, the fishermen now say they are scarcely worth the trouble of looking after. They uniformly attribute this failure to the steamboats passing along the coast.

As a manure for potatoes, the sea-wrack is not favourable to their dryness, but it greatly increases their produce, and the ground affords good crops of oats the following year without farther manuring.

The stem of *L. digitata* is round, but at Larne and also at Cairnlough, I have often found it very much compressed, and remarkably smooth throughout, but without any apparent specific difference.

L. bulbosa does not adhere to paper, and therefore is to be treated as a land plant.

Laminaria saccharina.—Very common, adheres to paper very well when young.

Laminaria phyllitis.—Common on the Antrim coast. I can scarcely consider this as distinct from L. saccharina. I have repeatedly seen the bullated appearance in the centre of the frond even in very young plants, but this nearly disappears in the dried specimen. Dr Greville states, Alg. Brit. p. 34, that it only adheres partly to paper in drying, but I believe that this will depend much on circumstances, for if the specimen be allowed to remain only a short time in fresh water, and be spread before it has lost its mucus, it will adhere pretty well, but less perfectly if permitted a longer stay, unless perhaps that it have remained so long that incipient decomposition has come on. Most of my specimens adhere closely.

Desmarestia aculeata. Common. I found many specimens at Cairnlough Bay in May, and a few in June, in its young state, with the tufted fringes. When old, it is very frequent lying in large masses on the shore. Dr Greville accurately remarks, that " old plants do not adhere to paper in drying, and become a little darker. Young plants, still furnished with the pencils of filaments, adhere, and do not change colour at all."—Alg. Br. p. 38.

I must here remark, that because species are found at the extremities of a kingdom, it may be very erroneous to suppose that they are common to all the intermediate parts of the coast. In the Flora Hibernica, for instance, it is stated that *Desmarestia ligulata* is " not uncommon on any of our shores from the Giant's Causeway to Bantry Bay." Now, during nearly two months spent this summer at Cairnlough Bay, in which scarcely a day passed that I did not examine some part of the shore, I did not find a fragment of it. I have from time to time gathered marine plants at Larne from my boyhood, and I never saw a trace there of this species, nor do I recollect ever finding a specimen of it but one, which I gathered a few years ago at Bangor, on the county Down, side of Belfast Lough.

Dichloria viridis.—Common at Cairnlough, often lying in masses on the shore as large as, and not unlike a horse's tail. It is to be preserved in the ordinary way, but, as is properly stated by Dr Greville, " in drying it does not adhere very firmly to paper ;" and the smaller the specimen, this is the more likely to happen ; but I have some specimens of large size, whose branches coming in numerous points of contact with the paper, give to each other such a mutual support that the whole adheres with considerable firmness. It will remain a long time unchanged in fresh water, and is little liable to decay itself though it so readily decomposes other species.

From a preconceived idea that its solvent powers might have some strong affinity with those of the gastric juice, I was pretty confident that it would possess the quality of reuniting milk, but on making the experiment this summer, I ascertained that it had no such property. When it lies for some time in contact with *Plocamium coccineum Ptilota plumosa,* and some other red-coloured species, it changes them to a bright violet, but this is fugitive, and disappears on drying ; the natural red colour continuing as before.

Chordaria flagelliformis.—Common at Cairnlough and most parts of our coast. Fine specimens grow on the rocks below Holywood near Belfast. I do not know any species which gives out so great a quantity of mucus after being immersed in fresh water as this.

Its glutinosity also causes much difficulty in preserving good specimens in the usual way, from its strong adhesion to the drying paper placed over it. The best management is to spread it and allow it to dry at leisure exposed to the air; in doing so it gives out a quantity of mucus of a brown colour, which tinges the paper along the sides of each branch, but this gives rather a richness and beauty to the specimen than acts as a deformity. This mucus often has a glistening appearance like the dried slime of a snail.

Chorda Filum.—Very common, growing most luxuriantly in situations somewhat sheltered from the violence of the open sea. It need not be spread in water, but if placed on white paper, and submitted to pressure under drying papers, by frequently changing these it will remain firmly attached to the former. By letting it steep in fresh water for several days to deprive it of its elasticity, it may be rolled into a spiral coil and then dried as above. It thus assumes an interesting though perhaps unnatural and fantastic appearance.

Dictyota dichotoma.—Not uncommon, the variety β (intricata) is very frequent on the Larne shore, though the normal form is rare, grows extremely flaccid soon after immersion in fresh water, and the easiest way to preserve it is to clean it in a plate with sea water, and to spread it immediately on the paper ready to receive it in the fresh water.

Delesseria sanguinea.—This species has its colour very much beautified by letting it steep in fresh water for five or six hours or longer: this changes it from a garnet to a rich rose red, though it does not always retain when dried the same beauty of tint which it exhibits when moist. I found specimens at Cairnlough in June, with the footstalks crowded with fructification, though it is commonly found in this state in winter and spring. It sometimes acquires a monstrous bulk; a single frond of one specimen in my collection gathered at Cairnlough Bay in July, measuring in length $10\frac{1}{2}$ inches (independent of the footstalk,) and at its middle $7\frac{1}{4}$ inches in breadth.* The finest specimens of the usual form of the plant I have ever seen, were gathered at Groomsport on Belfast Lough.

Delesseria sinuosa.—The colour of this is also rendered more beautiful by steeping several days in fresh water. It is very common on the Antrim coast, and grows to a great size. A frond of one of the

* It is excessively plaited at the edges, as are some of the other fronds from the same specimen, which are also cordate at the base in short, the variety β (latifolia) of Captain Carmichael, Eng. Flor. Vol. v. Part i. p. 285, but considerably larger than these described.

specimens I preserved in June at Cairnlough is $5\frac{3}{4}$ inches long from the commencement of its lamina from the footstalk to the point, and is 7 inches broad; another is $5\frac{1}{4}$ inches long, and $7\frac{1}{2}$ broad; and a third, $6\frac{1}{4}$ inches long, and somewhat more than 7 in breadth. The ciliary fructification is the most common, but the capsular is also frequent in the summer. Nothing can be more easy than to preserve this in the common way.

Delesseria alata.—This is also very easily put up, and, like most of the garnet red ones, its colour is brightened by long maceration in fresh water. It grows very luxuriantly on the Antrim coast.

Delesseria hypoglossum.—Tolerably frequent. The effect of fresh water on this species is almost instantaneous. When recent it has considerable rigidity, and a large variety, of which I found several specimens at Cairnlough Bay, and which at first sight I could scarcely recognize as being this species, was firm and cartilaginous, but after being in the fresh water for a few minutes was perfectly flaccid, and its colour changing rapidly from garnet to orange-red. It may be preserved in the common way without any trouble, and adheres closely to paper. The same may be remarked of *D. ruscifolia*, which is much more rare.

Notophyllum punctatum.—I found little of it this season. It also, when perfectly recent, is of a garnet red, and is as rigid as silk paper to the touch. When dipped in fresh water it emits a crackling noise, turns rapidly to a rosy orange tint, grows extremely flaccid, and gives out a large quantity of pink colouring-matter. It is so very thin that it dries rapidly, and requires no particular precautions.

Notophyllum laceratum.—Common, rigid when recent, becomes flaccid in fresh water, but is not otherwise changed, dries easily.

Rhodomenia laciniata.—Abundant, and often very large; is not altered by fresh water, except that it becomes less rigid, and more easily spread after some hours maceration. It is best to change the papers frequently during its desiccation, as it sometimes adheres when this is neglected. I preserved a single specimen at Larne in July, which was so large that I was obliged to separate it into portions, and spread it on four folio leaves, the dimensions of which are as follow:—Specimen on first leaf $7\frac{1}{2}$ inches from base to top; 14 inches in breadth; specimen on second leaf $7\frac{1}{4}$ inches high, and $12\frac{1}{4}$ broad; specimen on third leaf 7 inches high, and $9\frac{1}{2}$ broad; specimen on fourth leaf, five portions of the frond occupying the greater part of it.

Rhodomenia ciliata.—This species is very rare on the Antrim

coast, at least in any place I have had an opportunity of visiting. I mention it merely to notice, that it gives a transparency to the paper on which it is spread, as if the latter had been oiled at the points of contact.

Rhodomenia palmata.—Dulse. Dillisch.—Easily spread, but troublesome, especially when large, to retain in a flat expanded state on account of its contracting very much as it dries. Dr Greville observes, that "while rather young, the substance is very thin, slightly lubricous, and adheres to paper in drying, but not when in fructification."—*Alg. Br.* p. 93. Nothing can be more common than this species, but I have never seen it so extremely abundant as near the Garron Point, about three miles north of Cairnlough. It there seems to occupy the place which *Fucus vesiculosus* and *F. nodosus* do on other parts of the coast, and these species which do occur there are quite overgrown with it, as are also the stones and rocks. Large quantities are gathered at this place, and being dried, it is sold at a penny per pound to persons, who afterwards hawk it through the country towns for miles around: I was told that when taken to Ballymena, about fifteen miles from this locality, it is sold at 3d. or 4d. per pound. Dulse is brought in abundance to Belfast from various quarters, and is sold by huxters. Its usual price, as retailed by persons who come direct from the shore, and sell it from door to door, is about 4d. per pound, but in the dried state it is very light and bulky. There are few persons who are not pleased with its taste and flavour. In general it is not swallowed, but is chewed, sucked, and then discarded.

Dr Greville states, that "both the Scots and Irish wash the plants in fresh water, dry it in the sun, and rolling it up chew it like tobacco. But it is usually eaten fresh from the sea."—*Alg. Br.* p. 94. In this part of the world I have never seen it brought for sale when fresh, nor is it here ever washed in fresh water previously to drying, which, indeed, I should apprehend, would deprive it of those qualities for which it is prized, namely, its flavour and saltness.

At Ballycastle, a small variety is found of a very rich claret-colour, growing on rocks, which is more highly valued than the common kind. It is called Craigan Dulse, the latter name, however, being generally given to such as grow on rocks, and which is esteemed more highly than that growing on tangle and other sea-weeds. One favourite way of using dulse is, to cut it very small, and then eat it strewn thick on a slice of bread and butter.

Rhodomenia reniformis.—At Cairnlough Bay I found in June a few but very beautiful specimens of this rare species, which adheres

extremely closely to paper, and is very easily preserved. One specimen, about three inches long and two broad, of an obovate form, has its margin fringed with nearly fifty lobes, each on a narrow footstalk, and having so formal an appearance as rather to resemble a work of art than of nature. These lobes are generally circular, though some are ovate, and others obovate, and in width from the diameter of a pea or less, to that of a sixpence, the smaller ones occupying the torn edges of the frond.

Odonthalia dentata.—Common, is very easily spread, but when nearly dry the main stem contracts and separates from the paper, especially in old plants. The extremities of the fronds, however, sometimes adhere very well.

Laurencia pinnatifida.—When recent is rigid and cartilaginous, but soon gets flaccid in fresh water, and gives out much mucus and colouring matter. If allowed to remain too long in maceration it becomes almost gelatinous, and will then require to be nearly dry by exposure to air, before it is submitted to pressure, when it must be very often changed to prevent adhesion. The var. β. (*Fucus osmunda*, Gmel.) is not very frequent on our coast, though very fine specimens are occasionally thrown ashore. The other varieties are as common as on most coasts. In spreading variety β. it will be often necessary to cut away such superfluous branches, as if retained would encumber the specimen, and give it an indistinct and confused appearance. One very important part, indeed, of the art of preserving marine plants is to sufficiently prune luxuriant specimens. *Ptilota plumosa*, for instance, is often so luxuriant on our coast, that unless much thinned it would form on paper a confused and unsightly mass.* The same remark will apply to several other species.

Laurencia obtusa.—I have now found this species on the Antrim coast, north of Belfast Lough, and there, I believe, it only grows on the county Down side, though detached specimens are not unfrequently thrown on the opposite. About Bangor it is not uncommon, growing in pools of sea water. It is best preserved by letting it be nearly dry before it is pressed.

Chylocladia clavellosa.—Common in Belfast Lough, and on the Antrim coast, and of very large size; should be nearly quite dry before it is submitted to pressure.

Chylocladia ovalis.—I never found this species till June last, when

* This practice may be useful when preserving specimens for examination; in other cases the *character* of the species will be entirely lost.—Eds.

I detected it sparingly in a rocky pool about half-way between Glenarm and Cairnlough Bay. There were many other pools at the same locality, but it only occurred in the one. It was when growing almost entirely of a yellowish olive-green, but reddened a little when exposed to the air, and still more when steeped in fresh water. It was in fruit, having granules imbedded in the ramuli.

Chylocladia articulata.—Common. This and the other Chylocladia just mentioned, (the stem of *C. ovalis* excepted) are so succulent, that a person who had seen them only in the dried state could have little idea of the appearance they present in the recent. *C. clavellosa* when just spread on paper looks so thick, coarse, and complicated, that one might almost despair of its becoming fit for preserving, yet when simply left to itself it dries away to the greatest degree of tenuity, becomes so attached to the paper as to seem incorporated with it, and forms one of the most beautiful plants of the herbarium. *C. articulata* is best dried under pressure from the first, and the two or three first times it is changed, it will be advisable to remove the moisture it has discharged by blotting-paper.

Sphærococcus coronopifolius.—Not unfrequent. This species dries easily in the usual way, but its branches shrink up very much in diameter, I think, to more than one-half their original thickness. It adheres pretty well to paper, and, as remarked in the Flora Hibernica, becomes darker in drying. It " becomes horny in the thicker parts."—Grev. Alg. Br. p. 138.

Ptilota plumosa.—Common, growing especially on the stems of *Laminaria digitata.* This beautiful species is much improved for spreading by maceration for six or eight days in fresh water. When taken from the sea, (especially large specimens,) it is so rigid that the smaller ramuli escape from pressure and shrink up, thereby deteriorating the beauty of the specimen. This is considerably obviated by long steeping, from which the plant becomes more flaccid and obedient to pressure, and the colour is in general also more beautiful. Old specimens dry sometimes almost black, and this occurs sometimes even after long maceration, for this species retains its colouring matter with great pertinacity.

Iridæa edulis.—Common; but, as every botanist knows, is very seldom thrown ashore in a perfect state, being torn and perforated in every possible way. As it grows in pools of water, it may occasionally be found in a good state several inches long. It adheres strongly to paper, and is easily preserved. I am inclined to suspect, from the appearance of some of my specimens, that the perforations so common

in this species are not accidental, but that portions spontaneously separate from the frond and drop out.

Dumontia filiformis.—Very common. Should be nearly dry before pressure is used.

Porphyra laciniata.—Exceedingly common. This I believe is the only species used in Ireland under the name of Sloke (*Laver* in England.) It is gathered during the winter months only, the fronds being too tough in the summer. After being properly cleaned, it is stewed with a little butter to prevent its getting a burnt flavour, and is brought to Belfast, where it is sold by measure, usually at the rate of fivepence per quart. Before being brought to table, it is again heated, with an additional quantity of butter, and is usually eaten with vinegar and pepper. I have never heard of any ill effects attributed to its use.

Porphyra vulgaris.—Frequent on the coast, but so excessively abundant at Cairnlough Bay, that it often proved a serious obstruction to my collecting other species, by covering and hiding them from sight. Dr Greville mentions a specimen $3\frac{1}{2}$ feet in length, but I saw many specimens of considerably larger dimensions. It is the most difficult plant I know to preserve in perfection, not that there is any difficulty in spreading and going through the other steps of the process, but because, when it has nearly arrived at the last stage of drying, a moment's exposure to the air will cause it to contract so instantaneously, that the edges of the paper are immediately drawn towards each other, and, if attempted to be restored without the whole being first damped, the specimen tears through the middle, and becomes of little value. The edges of the plant adhere strongly to the paper when dry, or nearly so, but the centre does not adhere at all, and being as fine as gold-beaters' leaf, though having considerable strength, it at once loses the little moisture it possesses, on coming in contact with the air, and contracts with a force remarkable, when we consider its extreme thinness. If the paper be thin, its four corners will in a moment be brought almost in contact with each other. I believe the best chance of succeeding is, when we suppose that it is almost dry, to have a flat book (such as a music book) held open, and the pressure being taken off, to remove the specimen along with the drying paper covering it, as quickly as possible, between the leaves of the book, which is to be immediately closed, and not opened till next day, or till we are satisfied that the desiccation is absolutely complete.

The colour in this species varies very much,—in some specimens

being pale, and in others a rich reddish-purple; sometimes a bright orange, which latter, I believe, is the effect of incipient decay. I often observed it at Cairnlough, when floating in still water, to have an appearance as if it were bordered with white, and on closer inspection I found that this proceeded from the margin having attached to it in its whole extent minute air bubbles, which in certain lights looked exactly like a regular row of seed-pearl. On disturbing the plant, these bubbles were not very easily dislodged. They appeared equally in shade as in sunshine.

Polysiphonia violacea.—Abundant at Cairnlough Bay, in May, and in fruit in June. When put in fresh water, it almost immediately gives out a cloud of colouring matter, of the tint of Roman ochre, and becomes much darker in colour than before. When it has lain for a night in a wet state on the edge of a dish, I have found it on the following day to be almost black. When rolled in a large bunch on the shore by the action of the waves, its long fasciculated branches become so ravelled, that it is almost impossible to get them disengaged from each other, and from this cause I lost some fine specimens, as I found the task of unravelling them too trying for any ordinary degree of human patience. It adheres firmly to paper.

Dasya coccinea.—Common. When quite fresh, it is of a garnet-red colour, and, like most others of that tint, it becomes of a beautiful rose pink, when macerated in fresh water.

Ceramium rubrum.—I found a number of specimens of this very common plant, with distinct capsules imbedded in the substance of the filaments. The central parts of these were so opaque, that I could not with the microscope distinguish separate seeds, but each globular mass was surrounded by a hyaline ring, and in some specimens, where, from decay, the filament had become white, the globules retained the same intensity of colour as in other parts; shewing that their vital properties had protected them from the decaying process to which the part containing them had yielded.

I have an interesting specimen of *Delesseria sinuosa*, which is bleached almost as white as the paper on which it lies; but the ciliary processes upon its margin, containing the seeds, are of the usual colour and form, a beautiful contrast with the rest. It seems to me indeed not improbable that cases might occur where attention to circumstances of this kind might throw some light on the reproductive parts of some of these tribes.

Griffithsia setacea.—Common on the Antrim coast. It was chiefly in reference to this species that I threw out a caution with regard

to cleaning specimens in fresh water, for a very short exposure of it to the latter deprives it of most of its colour, and materially alters its appearance. By adopting the following method, I find that specimens of this species can be preserved in a much more beautiful state than by any other. I first clean the specimen in a dish containing *sea* water, and disentangle any branches that may be interwoven, and when ready, I transfer it to a paper lying in *fresh* water and spread it out. This is done without any trouble, for the plant is still rigid and perfectly tractable, whereas, had it been previously soaked in fresh water, it would be quite flaccid, and not at all so manageable. When spread, the paper is to be held up till it is well drained, and then to be laid flat, the moisture that remains continuing to act on the plant, causes the latter to give out its colouring matter, and this forms a cloud of bright pink surrounding the specimen, giving a richness and beauty to it which cannot in any other way be obtained. Chylocladia clavillosa, and some others, treated in a similar way, are also much enriched in appearance by their colouring matter given out. When almost dry pressure is to be applied.

Calithamnion plumula.—Not unfrequent at Cairnlough Bay. I have found it also in Belfast Lough; but at Larne, which is nearly intermediate between these two places, I have never seen a trace of it. Its colour is brightened by steeping for some hours, or even a night, in fresh water. It may be dried either with or without pressure.

VI.—*Observations on the Caprimulgus Europæus (Night-Jar.)*

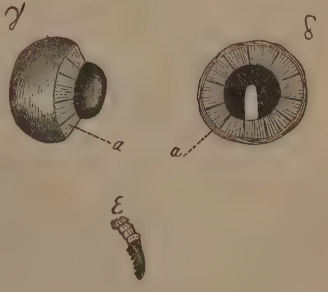
By Dr W. B. Clarke, Ipswich.

Birds of the genus Caprimulgus are nearly allied to the Hirundines, and appear to bear the same relation to them that the owls do to the hawks, or the Bombycidæ to the Papilionidæ, amongst the lepidopterous Insects.

The species more particularly under consideration is the Europæan night-jar, *Caprimulgus Europæus.* Its length is about ten inches and a-half. The plumage is of a brown colour, beautifully varied with spots and streaks of light yellowish-brown, white, cinereous, and black. The chin and sides of the mouth marked with white; and in the male, the tips of the two external tail-feathers, and a spot on the three distal primary feathers of the wings on each side are white. The markings on the different parts of the body are so complex and varied as almost to exceed a perfect description.

The night-jar is provided with an extremely wide mouth, which is beautifully constructed for taking its prey, which consists principally of the larger Bombycidæ. I have taken sometimes seven or eight moths, of the size of the yellow underwing, almost entire from the stomach. So beautifully is the mouth adapted for the reception of this kind of prey, that it opens like a trap, and presents a funnel-like aperture to receive the insect that the bird makes a dash at. The vibrissæ in this bird are very strong, and can be depressed against the side of the mouth, or erected at pleasure. Not only is the mouth remarkably large, but the vibrissæ are so directed when the mouth is open, as to reflect any insect into it which might otherwise have been missed by the bird in its attack. These vibrissæ stand out on either side of the mouth more than equal to half the width of the mouth itself, by which means the bird is rendered more sure of the seizure of its prey.

The eye of the night-jar has a structure very similar to that of eagles, hawks, and owls, and is, like the eyes of these, furnished with a strong bony ring, which surrounds the cornea, and strengthens the sclerotic coat in that part, and renders it so unyielding, that a slight pressure upon the sclerotic coat behind the ring causes the humours of the eye to be forced into a degree of convexity which could not be attained without this provision. By this beautiful yet simple contrivance the eye can be adapted to distant or close vision, according to the increase or decrease of convexity. The cornea has considerable dimensions, which enables the eye to receive a great deal of light, by which means objects become distinctly seen, which would be otherwise invisible in a paucity of light. The sketches γ and δ represent two views of the eye of the Night-jarr: γ is the lateral view, and δ is the front of the same eye: *a a* represent the situation of the osseous ring.



The middle toe of this bird is provided with a singularly pectinated claw, with the tooth-like processes pointing, with a gentle curve, inwards and backwards, as the bird sits grasping its perch. It is a difficult thing to decide upon what use this can be to the animal in its economy, for other birds, (the heron for in-

stance,) whose habits are extremely different to those of the night-jar, are provided with a pectinated or serrated claw very similar to this. The figure ε amongst the sketches represents the claw and part of the middle toe of one of the feet, shewing the serrated form of the claw.

The Caprimulgus Europæus is the only British species of this genus. It is a migratory bird, and generally makes its appearance in England about the latter end of May or the beginning of June, and remains with us generally until the end of September or beginning of October. As it proceeds from the eastward, it visits the Island of Malta in the Mediterranean, and the south of France, about a month sooner than it arrives in England. On the other hand, in its passage from our island, it leaves us about the latter end of September, and south of France about the latter end of October. Some French authors assert, that in rare instances this species has been shot in some of the woods and mountainous parts of Vosges in the middle of winter. This species has also been found in the open parts, as well as the woods and rocky parts, of Siberia and Kamtschatka.

The night-jar feeds upon insects which it takes in its flight, and this is principally done during the night, and by morning and evening twilight, these being the times at which it generally flies, although it may be occasionally seen at intervals during the day; but this appears principally to be when it has been driven from its diurnal retreat by some intruder. The plumage is peculiarly soft, which enables it, at its pleasure, to pass rapidly through the air without the vibrations of its wings being heard, and nature has so beautifully provided for its safety during its diurnal rest, that it can only, with the greatest difficulty, be discovered amongst the decayed branches and trunks of trees, the dead ferns, and leaves amongst which it hides; the colours of the plumage much resembling the tints of the bodies amidst which it secretes itself. The bird lays two eggs upon the bare ground where it is a little hollowed out beneath a whin bush, patch of ferns, or some other similar body, which serves as a kind of security or shelter to the parent bird whilst incubating. The egg is large for the size of the bird; has both ends nearly alike in size, is prettily mottled with brown, relieved by marblings of paler tints of the same colour. To give an idea of the habits of this bird, I shall here insert a few notes that I have made at different times respecting it. When in the middle of a heath in the neighbourhood of this town, and at the distance of a quarter of a mile from any wood, my atten-

tion was suddenly arrested by the appearance of a male night-jar, (Caprimulgus Europæus,) which rose from a small spot of bare ground by the side of a whin bush, and after flying about eight or ten yards, alighted upon the ground with its wings and tail expanded, and its head turned round towards me: here it remained a few seconds, and afterwards, slowly fluttered along the ground over the space of four or five yards, describing a curved course, and apparently with difficulty, appearing, by its actions, to imitate a wounded bird labouring to fly. This was doubtlessly done to decoy me away from the spot it had risen from; but which I walked up to, and there found two eggs lying in a slightly hollowed spot of ground beneath the shelter of a whin bush. One would suppose that the little animal was led by reason to act this admirable part, for the incapability of a wounded bird to rise into the air was so exquisitely represented by this little creature, that an individual unacquainted with the habits of birds might have been led from the site of its eggs, by the idea of his being able to secure it. After fluttering a short distance it rose from the ground, and flew slowly in a curved direction away from me, and was lost amongst the bushes that were thickly dispersed around. Upon a cursory view the eggs struck me as much resembling the white stones speckled with lichens which are commonly to be seen upon heaths, from which characters they would very generally elude the eye of any one walking past them, although he might even be in search of them.

Supposing that the bird would soon make its appearance again to visit its eggs, I was induced to secrete myself as well as I could behind a whin bush, about fifteen yards from the spot where the eggs were lying, and from this place I had an opportunity of observing the actions of this interesting little creature. After waiting about a quarter of an hour it came round to the whin bush under which its eggs were lying; over this it lightly skimmed and hovered, as if to ascertain whether its eggs were safe, and then suddenly turning, came flitting directly towards me, and approached within a few feet of my face, and then flew off. This it did two or three times at intervals of ten minutes or thereabouts. It was now about a quarter to nine o'clock on the 21st of June A. D. 1832, the sun had set about a quarter of an hour: the evening was mild and fine, and all was still, when the peculiar note of the night-jar was faintly heard, but the bird at this time was not visible: soon after this a faint squeak was heard, and a pair of night-jars were seen in the air, occasionally fluttering within a few yards of me, and at intervals remaining motionless in the air with their wings expanded; then fluttering and ho-

vering; then descending nearly to the ground with their wings expanded and elevated over their backs, at the same time striking them together, the back of one against that of the other, so as to produce a smart snapping sound. This was often accompanied by a sharp quick sound or squeak. At another time they would skim round me at a few feet distant from the earth,—again they would hover at a short distance from me, occasionally reiterating the sharp squeak before described,—then they would fly to a neighbouring whin bush, and, perching upon the top of it, commence the peculiar sound from which their name (night-jar) is derived, and which precisely resembles the sound produced by a wheel in quick rotation. Then they would rise into the air, again gliding through it without producing the least sound, again hovering, flitting, and squeaking. This they continued until, from the darkness of the night, I could see them no more, although I could at the same time distinctly hear them, and knew they were close by me. I observed when these birds were sitting that their wings were a little expanded, the body nearly horizontal, with the head rather elevated. These birds will sit sometimes in a wood perched upon a dead branch of an oak tree, with their bodies in a direction parallel with that of the branch, and in this situation, just as the sun goes down, will commence their jarring or vibrating note, and at intervals flit suddenly from this situation through an opening amongst the trees, skimming and hovering for a short time around and amidst the tops of the neighbouring oak trees, and then settle upon the branch from which they rose, and again commence their jarring note, then again dash into the upper part of the trees at some unwary moth, and again light upon the same bough, repeating this at intervals, and each time upon alighting commence their vibrating note, which they continue as long as they maintain their sitting posture. We have not at present been able to detect a bird in the act of making its *vibrating* note whilst upon the wing. Upon visiting a spot where these birds are likely to be, as soon as the sun goes down, if the evening be fine, their vibrating note may be heard if the birds are sitting, or their little sudden squeak several times repeated will announce their flight, and presently the little creatures will be seen like airy sprites floating at no great distance from the ground, or over the tops of trees, so prettily and lightly do they seem to float and fan themselves along. Often upon a heath, when the night is fine, yet dark from the lateness of the hour, and the vibrating sound of the night-jar is heard at no great distance, if one walks towards the sound it will soon cease, and after a few seconds of perfect stillness, the sound will be again heard at a distance. If we continue our course

we shall find the sound increasing upon us. Upon walking on in the same direction it will soon cease, and after an interval of silence will be heard again at a distance; for the eye of the night-jar is so beautifully adapted for nocturnal or crepuscular vision, that it observes the approach of an object, although a person is incapable of distinguishing his companion, or a body the size of himself at the distance of a few feet only. They will wander over a considerable tract of ground in the course of an evening in search of prey, beginning by flitting over the spot near which they have taken up their diurnal abode, and afterwards continuing to fly over some heath or moor at a considerable distance from the place where they were first seen. This bird is by no means common in the neighbourhood of Ipswich, but there are places not very distant from the town where a pair or two of them may be generally found every year.

VII.—*On the advancement of Local Botany in the environs of London, with remarks relative to the Dispersion of Plants in that vicinity, and the formation of plans exhibiting the Distribution of Species over localities.* By Daniel Cooper, Curator to the Botanical Society of London, &c.

The formation of the *Botanical Society of London*, and the publication of the Flora Metropolitana, or *Botanical Rambles within thirty miles of London*, have been the means of bringing forward numerous papers and plans, exhibiting the distribution of the localities of species in the directions frequented by the metropolitan botanist, and of advancing the objects of local Floras generally. No local Flora of the environs of so extensive a city, and, as will be presently shewn, producing species of so rare occurrence, having been published in a cheap and portable form,* induced me to attempt to arouse the minds of practical men towards the furtherance of this object. In directing their attention to this subject, I had two objects in view: the first, to solicit their aid for the purpose of endeavouring to arrive at a more accurate and actual Flora of the environs of so great a city—the latter, to obtain correspondents who might be willing to join in the establishment of a society for mutual intercourse and benefit. In

* About sixty years since "Curtis's Flora Londinensis" was published. This work contains plates of all the species that had been found round London. 3 large folio volumes. Mr Warner published a Local Flora on the plants of Woodford, Essex; and Mr Blackstone of Harefield, Middlesex. The localities in these works cannot be relied on, having both been brought forward upwards of sixty years since.

both my objects have been realized to a greater extent than had been expected. Contributors without number have kindly lent their assistance towards the accomplishment of the first object, and the second has already manifested itself by the formation of the "Botanical Society of London." That local botany is attracting more notice daily throughout the kingdom, is evident from the number of local floras of late years published, and valuable, indeed, they are to the naturalist, —if we consider the immensity of labour, trouble, and time, spared to the lover of nature for other pursuits.

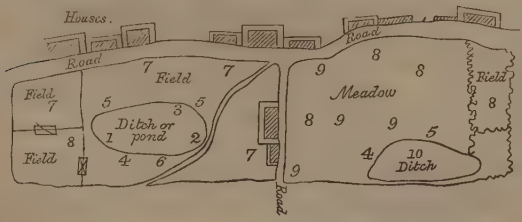
The rapid formation of the Botanical Society of London affords a still greater proof of the progress of that department of science, since we find that out of seventy members elected since its formation, (29th Nov. 1836,) two-thirds at least devote the major part of their time to practical botany. That a society embracing the objects it does, has been long a desideratum in the metropolis, cannot be denied, and is evident from the number of its members, and also from the various important memoirs that have been brought forward relating to subjects deserving the attention not only of the practical, but the physiological and geographical botanist.

I shall now offer some views respecting the formation of plans, exhibiting the actual flora of the vicinity of, or in, any particular locality, in order that the botanist, at a glance of a map or plan of such a locality, would be enabled with greater facility to arrive at or near the spot where any species have been observed to grow. The first idea of this nature was brought before the Botanical Society of London on the 5th January 1837, illustrating a paper which I read on the distribution of plants in one of our principal localities in the immediate vicinity of London,—a locality for years celebrated for the profuse supply of specimens it has yielded to the naturalist. I allude to Battersea Fields, the spot where most of our ancestors and ourselves have often rambled with so much profit and delight. In the subsequent part of this paper, I shall give in a table the number of genera and species found in various localities.

In producing plans of this kind, there is but one objection, viz. that many botanists of the present day are not content with collecting one, or even half-a-dozen specimens, more particularly if the plant is of uncommon occurrence, and I have known instances, where whole species have been rooted out by the eagerness and avarice of the collector. Such measures ought not to be adopted to the destruction of the habitats of species. If the plants are *annuals* it is doing injustice to the rising generation of botanists; if they are *bien-*

nials or *perennials*, surely collecting the portion above the earth in most instances is sufficient, without rooting out the species entirely. There are certain plants of which the root is necessary for distinguishing and defining specific characters; in such cases some attention should be paid to the number of species observed in the locality; bearing in mind the necessity of leaving a sufficient number for the continuance of the propagation of the species. It has been observed, by some eminent botanists of the present day, that the formation of the different societies for the exchange of specimens, &c. will in a great measure have the effect of destroying some of our richest localities. Let it not be understood, that the formation of maps and plans of the nature before alluded to, are for the purpose of facilitating these ravages. That in the hands of the most avaricious they will do so, I have not the slightest hesitation in acknowledging, but it is to be hoped that not many of those individuals now exist, who would thus damp the ardour and zeal of the rising generation of botanists, and also be the means of retarding science, while the execution of such ideas may prove beneficial to the scientific inquirer.

The plan of Battersea Fields before alluded to, exhibited the various houses, ditches, fields, and other minor but interesting stations, on the scale of two feet to the mile. This plan was executed and the locality surveyed by myself, in order that accuracy might be the result. *I afterwards learned that this labour and trouble* might have been spared, by inspecting the plan of the parish or parishes from which the rates are made, and therefore, on a scale sufficient for the present purpose; it is, I understand, generally to be found hanging up in the vestry room, or in the care of the vestry-clerk of the parish. Such plans might be conveniently applied to local Floras, and would be admirable *desiderata* to such works, numbering the species in the letter-press to correspond with the numbers on the plate; thus supposing the cut to represent a plan of a locality, and the figures somewhat the situation of the plants there found.



1. Alisma Damasonium
2. Menyanthes trifoliata
3. Villarsia nymphæoides
4. Drosera rotundifolia
5. Narthecium ossifragum
6. Campanula hederacea
7. Galium verum
8. Rhinanthus crista galli
9. Saxifraga granulata
10. Butomus umbellatus

By using figures in the place of writing or printing the names in full, much unnecessary space can be dispensed with; and thus a plan of a locality on the scale of three or four inches to the mile, might be conveniently introduced into a duodecimo or octavo volume. Any additional localities the botanist might discover could with facility be marked on the spot in their proper situations, by making additional figures on the plan, which figures of course to agree with the names of the plants upon a separate page. In this way it appears to me that much time might be spared the naturalist for his other pursuits, and also be the means of producing more complete and accurate local Floras than any plan hitherto adopted.

In conclusion, I have a few remarks to make upon the dispersion of species in the environs of London. The former hints respecting the eradication of plants will be sufficient to those collectors who are in the habit of *herbalizing* into various counties. Such individuals must bear in mind, that the lover of natural history is the more or less proud of his country, according to the specimens of interest and value that have been collected in it. Take for instance the county of Surrey—what would it be to the botanist without its orchideous and chalk plants, for which it has been long celebrated. At Boxhill, and the hills adjoining, with other places in the neighbourhood, (and in this, as well as all places hereafter cited, within a distance of thirty miles of London,) the following lists of orchideous and other uncommon plants have been found.

Orchideous Plants.

† Ophrys apifera, 30.
† ——— muscifera, 30.
† ——— aranifera, 31.
——— arachnites, 30.
† Anacamptis pyramidalis, 34.
† Gymnadenia conopsea, 34.
† Platanthera bifolia, 16, 34.
* Platanthera viridis, *(Banstead Down.)*
† Aceras anthropophora, 20.
† Orchis maculata, 5, 16.
† ——— mascula, 16.
† ——— fusca, 34.
——— latifolia, 15.
† ——— morio, 34.
——— ustulata, 34.
† Orchis bircina, 34.
† ——— militaris, 34.
* Malaxis paludosa (*Reigate.*)
Herminium monorchis, 32.
† Neottia nidus avis.
† Listera ovata, 15-34.
† Spiranthes autumnalis, 29-30.

* Those marked thus * have been recently discovered in this county.
——— † have been also discovered in Kent.

The numbers affixed correspond to the pages where the localities may be seen in the "*Flora Metropolitana*," 1836.

† Epipactis grandiflora, 30.
† Epipactis ensifolia, 32.
——— palustris, 117
† Epipactis latifolia, 4.

Xanthium strumarium, 8, 98.
Tulipa sylvestris, 3.
Myosurus minimus, 1, 23.
Chelidonium laciniatum, 1.
Polygonum dumetorum, 4.
Symphytum tuberosum, 3.
Anemone apennina, 1, 39.
Melilotus leucantha, 30.
* Crocus aureus,
——— vernus, 15.
Narcissus biflorus, 15
Fritillaria meleagris, 25.
Dentaria bulbifera, 21.
Leonurus cardiaca, 21.
Botrychium lunaria, 22.
Scrophularia vernalis, 22.
Coronopus didyma, 25.
* Utricularia vulgaris,
Astragalus hypoglottis, 26.
* Corydalis lutea,
Hesperis matronalis, 30.
Impatiens noli-me-tangere, 30.
——— fulva, 43.
Scilla autumnalis, 30.
Lilium martagon, 31.
Chrysosplenium oppositifolium, 39.
Vaccinium oxycoccus, 40.
Adoxa moschatellina, 40.
Lonicera xylosteum, 40.
Myrica gale, 41.
Osmunda regalis, 42.

From inspecting the above lists it may be easily imagined that the botanist resident in Surrey is not a little proud of his country. The metropolitan botanist also can certainly boast of a Flora perhaps not to be equalled throughout the whole of England. In this district he is particularly rich in orchideous plants. Of the 36 species described as British, 26 are found dispersed within thirty miles from London.

In Kent, it may be observed that the species are not quite so abundant, in the ratio of 21 to 36, including two species that have not as yet to my knowledge been found in Surrey, at least within the range before specified, viz. **Orphrys fucifera* and *Orchis tetrophosanthos*, 61. These plants are not confined to the counties of Surrey and Kent, in the London district, as might perhaps be supposed; they also occur in Essex and Middlesex, but not so frequently. Towards Harefield and St Albans they make their appearance again in great quantities. We have then in the combined counties of Surrey and Kent, as far as observation has gone, 28 species out of 36 British orchideous plants, the remaining eight being mostly confined to the northern districts.

Nor is Kent behind her sister county in other rare plants,—*Althæa hirsuta, Bupleurum tenuissimum, Hutchinsia petræa, Valerianella calcitrapa, Hyoscyamus niger, Paris quadrifolia, Gentiana amarella*, and *G. pneumonanthe* may be considered but a few of them.

With regard to the distribution of the whole of the species within thirty miles of London, I have from careful examination and research arrived at the following result:

Lindley's 1st edition of Synopsis of British Flora.

		Nat. Ord.	Genera	Species
Dicotyledons.	1. Dichlamydeæ,	67	370	904
	2. Monochlamydeæ,	14	25	91
	3. Achlamydeæ,	5	14	86
		86	409	1081

Monocotyledons,	1. Petaloideæ,	Nat. Ord. 16	Genera 58	Species 147
	2. Glumaceæ,	2	69	224
		18	127	371

Found within thirty miles of London. (Flora Metropolitana.)

Dicotyledons.	1. Dichlamydeæ,	Nat. Ord. 64	Genera 317	Species 683
	2. Monochlamydeæ,	13	20	72
	3. Achlamydeæ,	5	14	49
		82	351	804
Monocotyledons,	1. Petaloideæ,	Nat. Ord. 16	Genera 46	Species 106
	Glumaceæ,	2	57	137
		18	103	243

Total in Lindley's Synopsis.

Dicotyledons,	Nat. Ord. 86	Genera 409	Species 1081
Monocotyledons,	18	127	371
	104	536	1452

Total in "Flora Metropolitana."

Dicotyledons,	Nat. Ord. 82	Genera 351	Species 804
Monocotyledons,	18	103	243
	100	454	1047

Several papers having been read before the Botanical Society of London on the distribution of the number of species in certain localities within a few miles of London, the results might perhaps be interesting to some of your readers. Mr Irvine* found 670 species within two miles of Hampstead, Middlesex, and 900 within the same distance of Croydon, Surrey. Dr Macintyre† found 10 genera, including 23 species of ferns—65 genera, including 136 species of Monocotyledons,—and 265 genera, including 542 species of Dicotyledonous plants around Warley Common, Essex. I‡ have found 61 Natural Orders, 214 genera, including 406 species in Battersea Fields, Surrey—some of them of rare occurrence.

The following tables have been drawn up from various works, in order to exhibit the number of *genera* and *species* contained in some of our local Floras; the *genera* and *species* have not been reduced to a common standard, but have been calculated as they appear in those works.

* Mr Irvine's paper was read, November 17, 1836.

† Dr Macintyre's paper was read, December 15, 1836.

‡ Paper read, January 5, 1837.

The numbers placed over the tables correspond to the notes, [p. 170.] to show from what works the data have been taken.

	1		2			3			4	
Class 1.	British Flora.		Lindley's Synopsis, 1st edition.			English Flora.			Scotch Flora.			Irish Flora.			Great Britain.	
VASCULARES	Gen.	Spec.	Nat. Ord.	Gen.	Spec.	Nat. Ord.	Gen.	Spec.	Nat. Ord.	Gen.	Spec.	Nat. Ord.	Gen.	Spec.	Gen.	Spec.
Dicotyledons.	517	1575	86	409	1081	86	381	1067	82	333	902	79	313	782	521	1636
Monocotyledons.			18	127	371	21	104	331	20	83	280	18	74	135		
Total,	517	1575	104	536	1452	107	485	1398	102	416	1182	97	387	917	521	1636

	5		6			7		8			9	10		11	
Class 1.	Fl. Edinensis.		Flora Metropolitana.			Flora Cantabrigiensis.		Flora of Berwick.			Flora Woodfordiensis	Flora Oxfordshire.		Flora Oxoniensis.	
VASCULARES.	Gen.	Spec.	Nat. Ord.	Gen.	Spec.	Gen.	Spec.	Nat. Ord.	Gen.	Spec.	Gen.	Spec.	Gen.	Spec.	Gen.	Spec.
Dicotyledons,	385	894	82	351	804	414	850	63	526	286	263	824	370	775	324	729
Monocotyledons,			18	103	243			13	155							
Total,	385	894	100	454	1047	414	850	76	681	286	263	824	370	775	324	729

	12			13		14		15		16		17		18	
Class 1.	Flora Devoniensis.			Flora Glottiana		Flora Bedfordiensis.		Flora Berwick.		Flora of Anglesey.		Fl. Northumb. & Durham.		Flora Snowdonian Mountains, (rare plants.)	
VASCULARES.	Nat. Ord.	Gen.	Spec.	Gen.	Spec.	Gen.	Spec.	Gen.	Spec.	Gen.	Spec.	Gen.	Spec.	Genera.	Species.
Dicotyledons,	66	284	587	292	662	295	719	234	466	318	763	343	875		120
Monocotyledons.	15	59	187												
Total,	81	343	774	292	662	295	719	234	466	318	763	343	375		120

Notes to Table, p. 169.

1, 2, 3. Magazine of Zoology and Botany. Vol. i. p. 267.

4, 5. Calculation from the Prospectus of the Botanical Society of Edinburgh. 1836.

6. Flora Metropolitana, or Botanical Rambles within 30 miles of London. By Daniel Cooper. 1836.

7. Flora Cantabrigiensis. By Richard Relham. A. M. 3d edit. Cantab. 1820.

8. Flora of Berwick upon Tweed. By G. Johnston, M. D. Edinburgh, 1829.

9. Flora Woodfordiensis.—A Catalogue of Plants growing at Woodford, Essex. By Richard Warner, London, 1771.

10. Flora of Oxfordshire and contiguous counties. By Richard Walker. Oxford, 1833.

11. Flora Oxoniensis. By John Sibthorp, M. D. Oxonii, 1794.

12. Flora Devoniensis. By Rev. J. P. Jones, and J. F. Kingston. London, 1829.

13. Flora Glottiana.—A Catalogue of the Indigenous Plants on the banks of the river Clyde, and in the neighbourhood of the city of Glasgow. By Thomas Hopkirk. Glasgow, 1813.

14. Flora Bedfordiensis, comprehending such plants as grow wild in the county of Bedford. By Charles Abbott, M. A. Bedford, 1798.

15. A Catalogue of the Plants of Berwick upon Tweed. By John V. Thompson, Surgeon. London, 1807.

16. Flora of Anglesey, in Welsh Botanology. By Hugh Davies. London, 1813.

17. Flora of Northumberland and Durham, in the Botanist's Guide through those counties. Newcastle-upon-Tyne, 1805.

18. Flora of the Snowdonian Mountains (rare plants only.) By the Rev. W. Bingley in 1798–1801. (Appendix to Jones's Illustrations of the Natural Scenery of the Snowdonian Mountains.) London, 1829.

VIII.—*Contributions to the Natural History of Ireland.* By William Thompson, Esq. Vice-President of the Belfast Natural History Society. (Continued from p. 57.)

No. 3.—*On the Birds of the Order Raptores.*

Goshawk—*Astur palumbarius*, Bechst.—" I have seen a young one got at the rocks of Magilligan (Londonderry.")—MS. late Mr Templeton, where it is also stated under the head of Gentil Falcon. " On 25th July 1809, I saw at Carrickfergus a stuffed specimen that had been shot at the Gobbins, (Antrim.")

I have never seen an Irish specimen of this bird. The term goshawk or *goose**-hawk is commonly applied in the country to any of

* In reference to its comparatively superior size.

the Falconidæ of a larger size than those ordinarily met with, such as the common buzzard (Buteo vulgaris,) &c.

Sparrow-Hawk—*Accipiter fringillarius*, Will.—Is common in the enclosed and wooded parts of Ireland. It is certainly the boldest of the British Falconidæ. I have known this species to be shot in a yard attached to an occupied dwelling-house in the country, where it was discovered by the uproar produced among the inhabitants of the dove-cot. Dr J. D. Marshall was, in October 1833, sent an old female sparrow-hawk, that in pursuit of a thrush (Turdus musicus) followed it into a cottage in the neighbourhood of Belfast, where both were secured. On some stuffed birds being placed near this hawk, she dashed fiercely at them. When bent on spoliation, the sparrow-hawk scruples not to enter even the church itself, as a male bird was about two years since caught by the sexton in Newtownbreda Church (Down,) whither it had pursued some small bird, I believe a robin (Sylvia rubecula.) A sparrow-hawk was once observed by Mr R. Langtry to strike one of his sea eagles which was perching on his shed; and when his golden eagle was at liberty, he has not only seen it struck by one of these birds in passing, but was once witness to the latter turning back and repeating the impertinence. Another ornithological friend, on climbing a tree to one of their nests, and when within a very few yards of it, was attacked by the female bird, and his cap at one stroke sent to the ground. He speedily followed it, lest the next should be on his bare head, but, replacing the cap more firmly on, he gallantly remounted to the nest, which he had been in the habit almost daily of visiting, and was gratified with a sight of the young birds that day hatched, which accounts for the boldness of the parent. He describes the young as being beautiful in their first garb of snow-white down.

I have known this species to build only in trees, in Ireland. The stomachs of several specimens examined by me contained the remains of birds alone.

Kite—*Milvus ictinus*, Sav.—Under the name of "Kite," a bird appears in many of the statistical surveys of Irish counties, as well as in other catalogues of native birds, but the true Falco milvus or Milvus ictinus has never been seen in Ireland, either by myself or any ornithologist with whom I have communicated, nor am I aware of the existence of a native specimen in any collection. When Ireland presented an aspect different from the present, and was a well-wooded country, the Kite may have been one of our

birds, but the larger species of the Falconidæ, and chiefly the common buzzard, being in some places called kite and glead, as well gos-hawk or goosehawk, leaves us in uncertainty whether the real Falco milvus was ever indigenous to the country. And for the same reason the doubt is no way removed even by the "authority" of the Irish Statutes, in which rewards are offered for the destruction of the "kite" as one of the birds of prey. Vide 11th Anne, ch. 7 and 17, Geo. II. ch. 10.*

Mr R. Langtry, when at Loch Awe, in Argyleshire, early in the summer of 1833, procured from the nest two young kites, which proved a highly interesting addition to his aviary. They at once became very tame and familiar, and were so gentle in disposition as to be most engaging. Every morning they had their liberty, never flew far, but soared to a great height in the air, and, "in still repeated circles," displayed their peculiar and graceful flight. To either lure or "fist" they always returned when called. Mice were preferred by them to birds or any other food. When these kites were on wing rats let off from the cage trap were expertly caught by them.

Common Buzzard—*Buteo vulgaris*, Will.—This species is of common occurrence in Ireland. From the most extensive and best wooded demesnes in Down and Antrim, I have at every season of the year seen specimens. In such localities they build in trees, whence I have heard the young call in Shane's-Castle Park. The buzzard is also found in the retired, rocky, and mountainous parts of the country, where trees are quite unknown, and there forms its nest in the cliffs.

When at Rosheen mountain (before-mentioned as the eyrie of the Golden (?) Eagle) near Dunfanaghy, in June 1832, we saw a pair of buzzards, and heard their young call from the nest on a ledge of rock, midway down a precipice. This we were told had, until the present season, been for many years occupied by a pair of ravens (Corvus corax,) which it was stated did not yield their possession quietly, but fought hard, though in vain, against the buzzards' usurpation. My friend being desirous of obtaining the young birds, a man undertook to descend the rock for them in the ordinary way, being secured from falling by a rope fastened about his body, and held by persons above. However, from its impending at the summit, this was rather perilous, and for greater safety he preferred ascending

* For extracts from the Statutes, I am indebted to Francis Whitta, Esq. of Belfast.

from the base; the preventive just mentioned against accidents being in this case likewise resorted to. When the least apprehension of danger was manifested, we endeavoured to dissuade him altogether from the attempt, but his father, an old gray-haired man, insisted, though gain was never thought of, that he should not turn craven, and was so froward in leaning over the cliff to direct his son's movements, that we verily feared his own life would become a sacrifice, but all expostulation was in vain. By this method three young birds were taken, a fourth escaping by flight. The climber said the nest was composed of the strong stems of heather and roots of grasses, and lined with the fur of hares and rabbits, and that it would have held several more than the four birds it contained. The legs of rabbits and hares were lying about it.

When at Macgilligan, in the county Londonderry, in July 1833, I saw a buzzard, which appeared to be the Buteo vulgaris, soaring about the basaltic precipices, and flying from one pinnacle of rock to another, its young being all the while very vociferous, and one of them loudly heard above the others, calling similarly to the male bird brought from Donegal last year, satisfied me respecting its species. The continual and loud cry of the latter bird, as we drove from Dunfanaghy to the city of Londonderry, proved ludicrously annoying to us, by giving evidence of the contents of our baskets to all persons we met, (it was a holiday,) and thus drawing their attention towards us. The other two buzzards and the eagles remained generally quiet. These three buzzards, but especially the male, became very familiar. When let off in the morning, his favourite perch was upon some stacks of grain, where he remained patiently watching for mice, which he has been seen to catch, but was not always successful, sometimes dashing his talons into the straw, and bringing them out empty. He preferred mice to rats, though very expert at killing both. He was quite a pet bird. One of his favourite tricks was to fly on his master's feet and untie his shoe-strings. But he was likewise very bold; and, taking a dislike to a certain individual, flew at him whenever he appeared, and endeavoured to strike him about the head. Against these attacks a walking-stick generally served as a defence; but the buzzard once came upon him unawares, and inflicted a severe blow on the back of his head. This bird occasionally astonished strangers, by smartly striking them on the hat, so as to send it over their ears.

At the range of inland rocks called Salagh Braes, and at another similar locality in Antrim, the buzzard nestles, as it is likewise presumed to do at the promontory of Fairhead, in the same county, a pair of these birds having been seen there in June last by my friend

Richard K. Sinclaire, Esq. who on the same day observed, in addition to them, pairs of sea-eagles, peregrine falcons, and kestrels, all of which are well known to have eyries there.

A native specimen of the buzzard, which I lately examined, had a few feathers half an inch in length about the middle of one of the tarsi, which was bare for nine lines above them.

Rough-legged Buzzard—*Buteo lagopus*, Vig.—About the middle of October 1831, a bird of this species was killed near Dundonald, in the county of Down.* On dissection, the remains of birds and of a full-grown rat were found in its stomach. It was purchased by Dr J. D. Marshall, and is now in his possession. This bird accords with Temminck's description of the adult male. It has not any indication of bands on either side of the tail. In Mr Selby's figure of the female, a band appears near the tip on the under side.

About this time two others were seen at Killinchy, in the same county, and one of them shot, but it was, through ignorance, lost as a specimen. Last autumn, the gamekeeper at Tollymore Park described to me a bird, which, from size, being feathered to the toes, &c. evidently had been of this species. It was shot a few years ago (probably at the same period as the others) in Castlewellan demesne (Down) when carrying off a young rabbit.

Honey-Buzzard—*Pernis apivorus*, Cuv.—The following notice of this species appeared in the Magazine of Natural History for 1833, Vol. vi. p. 447.

"At a meeting on July 23, 1833, of the Council of the Belfast Natural History Society, Mr W. Thompson, V. P. stated, that, on the 11th of June last, a fine male specimen of the honey-buzzard, which is unrecorded as having ever before occurred in Ireland, was, when in company with a similar bird, most probably the female, shot by Robert G. Bomford, Esq. in his demesne of Annandale, in the vicinity of Belfast; and who, on being informed of the rarity of the bird, had most handsomely presented it to the Belfast Museum. Mr Thompson, who saw the specimen when recent, related, that the bill and forehead were covered with cow-dung, in such a manner as to lead him to suppose the bird had in that substance been searching for insects. On examination of the stomach, which was quite full, it was found to contain a few of the larvæ, and some fragments of coleop-

* This is the individual mentioned in "Mag. Nat. Hist." Vol. v. p. 578.

terous insects, several whitish-coloured hairy caterpillars, the pupæ of a butterfly, and also of the six-spot burnet-moth (Zygæna filipendulæ,) together with some pieces of grass, which it is presumed were taken in with this last-named insect, it being on the stalks of grass that the pupæ of this species of Zygæna are chiefly found. Mr Thompson remarked, that this insectivorous food must to the honey buzzard have been a matter of choice, the bird being in the full vigour of its powers, and the district in which it was killed abounding with such birds, as, were they its wished-for prey, it might have easily captured and destroyed."

The individual thus dwelt upon was a mature male. The bands on the tail exhibit a greater inequality than is represented in any figure I have seen, the first and second being less than an inch apart, the third more than two and a-half inches distant from the second band.

Marsh Harrier—*Circus rufus*, Briss.—I have had opportunities of examining four recent marsh harriers, which were killed in Down and Antrim, but all in different localities—one only was an adult male. A person conversant with birds has mentioned to me, that he once saw an old male bird of this species on the banks of Belfast bay at ebb-tide.

A brood of these birds taken a few years ago from the nest on the mountains of the county Monaghan was reared by Captain Bonham of the 10th Hussars, who intended trying them in falconry, but for this purpose they proved most intractable. Some years since, three or four young marsh harriers were brought to Belfast from the mountains of Ballynascreen (Londonderry) and I am credibly informed that the species breeds at Claggan (Antrim). It is considered very rare in Donegal. * Mr R. Ball states in a letter to me, that its young have been brought to him at Youghal (Cork). In suitable localities in the counties of Tipperary and Dublin I am informed that it occurs.

On dissection, the stomach of one of the first mentioned was found full of frogs.

Hen-Harrier—*Circus cyaneus*, Flem.—This handsome species is generally distributed in Ireland. In Antrim I have been assured that it breeds at Claggan, and occurs at all seasons in the mountains around Ballymena. From an adult male being seen by an ornithological friend on the 15th of May near Glenarm, it is probably

* Mag. Nat. Hist. Vol. v. p. 581.

indigenous to that neighbourhood. Two mature male specimens were shot, I have been told, near Dublin, in July 1836. The hen-harrier does not appear in Mr Stewart's published catalogue of the Birds of Donegal; but in a letter, with which he lately favoured me, that gentleman mentions it as a subsequent addition, but at the same time as a rare and only occasional visitant. It is stated by Mr R. Ball to be sometimes shot about Youghal, and is enumerated among the birds seen in August 1835, in Connemara, by Mr Lingwood. *

When looking for snipes in a boggy spot in the Belfast mountains, I once shot a female bird of this species, hovering in the manner of a kestrel over it. She was not alarmed by the presence of myself and friend, nor by that of our dogs engaged in "beating" the ground immediately beneath.

A gentleman of my acquaintance has long known "white hawks" to have their nests every summer in his mountains at Ballynascreen (Londonderry,) where he had two of them last year. They are always placed on the ground among the heath. When at "the Horn" in 1832, the gamekeeper told me of his having the winter before seen a "white hawk" strike a curlew (Numenius arquata) in passing, and break its wing, which so disabled the bird, that it became an easy capture to my informant. In a communication lately received from the Rev. Thomas Knox of Toomavara, it is remarked under the head "Hen-Harrier"—"From the description given by different persons, I have no doubt that this bird frequents the bogs adjoining the Shannon, where it is called the 'white kite.' I have not been able to get one of them shot, but have seen it at a distance frequently." A "large bluish-white hawk" has been mentioned to me by a correspondent, as frequent about Clonmel. The localities have been thus particularised, as the ash-coloured harrier may possibly be the species alluded to under some of the latter appellations.

Eagle Owl—*Bubo maximus*, Sibbald.—The only record of the eagle owl's occurrence in Ireland appears in Mr Stewart's Catalogue of the Birds of Donegal, in the following words:—"Four of these birds paid us a visit for two days, after a great storm from the north, when the ground was covered with snow. They have not since been seen here. As I am informed that a pair of them breed in Tory Island, about nine miles to the north of this coast, it is probable that they came from that island. I have heard of them nowhere else."†

* Mag. Nat. Hist. Vol. ix. p. 128. † Ibid. Vol. v. p 581.

Long-eared Owl—*Otus vulgaris*, Flem.—Occurs throughout Ireland, and is resident. Where a sufficient extent of wood exists in Down and Antrim, it is a common species, and is remarked by a correspondent to be "not uncommon" in Tipperary. It is considered rare in Donegal.*

I have known this species to be shot in the dusk of the evening, a mile from high-water-mark, in Belfast Bay, by a person waiting in a barrel (sunk in the ooze) for the flying of widgeon. The white owl has in several instances been obtained by these shooters.

An individual, well acquainted with the long-eared owl, informs me, that in a close plantation of spruce firs (Abies communis) at Scoutbush, near Carrickfergus, he for several years had its nests, which, in consequence of the trees being young, were placed not higher than six feet from the ground.

The Rev. Thomas Knox, in a letter to me, mentions the contents of the stomach of a long-eared owl, shot at Killaloe, to be "part of a rat, the skull of a mouse, and the heads of two sparrows." A sparrow almost entire was found in the stomach of one examined by myself.

Short-eared Owl—*Otus brachyotos*, Flem.—This species is one of our regular winter visitants in the north of Ireland. October the 13th is the earliest date of its occurrence to me. It has been added to the birds of Donegal by Mr Stewart, since the publication of his catalogue, and its migration in winter to the mountains of Wexford and Tipperary has been communicated to me.

I have several times met with, and shot this owl in the neighbourhood of Belfast, and invariably in wet and boggy places, where snipes might be expected. One of these owls being only wounded, afforded me the opportunity of observing the exceeding brilliancy and depth of its golden eyes. In the stomach of a specimen examined on the 16th December last, I was surprised to find the legs of a purre (Tringa variabilis,) as the localities frequented by the two species at this season are generally very different.

White-Owl—*Strix flammea*, Linn.—This beautiful species is the most common owl in Ireland. I have had the following evidence of its regular flight to some distance from its domicile, just as twilight commences. Near Belfast there is a considerable extent of low-lying meadows, which are flooded by heavy rains, and at such times are re-

* Mag. Nat. Hist. Vol. v. p. 581.

sorted to by various species of wild-fowl (Anatidæ.) The flood never attaining such a height as to cover the banks surrounding these meadows, they are frequented by persons for the purpose of shooting the wild-fowl on their evening flight, and to whom the owl, on as "murderous deeds intent," occasionally falls a victim. On becoming acquainted with this fact, it occurred to me that the owl's visit might be in consequence of the flood driving its prey from the meadows to their banks, where, as the only place of refuge, it would be more abundant; but I have ascertained that the owl equally haunts them when the flood is gone. From the distance of half a mile I have seen it flying towards them.

The white owl is a well known visitor to the dove-cot, and in such a place, or rather a loft appropriated to pigeons in the town of Belfast, I am informed by an observant friend that a pair once had their nest. This contained four young, which were brought up at the same time with many pigeons. The nests containing the latter were on every side, but the owls never attempted to molest either the parents or their young. As may be conjectured, this owl's nest was frequently inspected during the progress of the young birds. On the shelf beside them, never less than six, and so many as fifteen mice and young rats (no birds were ever seen) have been observed, and this was the number they had left after the night's repast. The parent owls when undisturbed remained all day in the pigeon-loft.

Of the stomachs of four white owls I have examined, one contained the remains of rats; another of mice; a third was filled to distension with portions of eight mice; and the fourth exhibited only a part of a coleopterous insect of the family *Harpalidæ*, that could not when perfect have exceeded nine lines in length. A friend, too, informs me, that, on examining the pellets cast by these owls, which he has very frequently done, he has often perceived, in addition to the fur and bones of rats and mice, the wing-cases of beetles shining through them.* The remains of birds he never detected in them. It is only, I believe, in dearth of other prey that this owl attacks any of the feathered tribe.

A white owl, kept for upwards of a year in a friend's house, was from the first kindly disposed to the servant who fed it, but pugnacious towards its master, instantly striking with its talons at his finger when placed against the cage, but this he in some degree taught it. When spoken to by any one, it returned the recognition by most

* I do not recollect these mentioned as the food of the white owl in any work on British Ornithology; "scarabees" are, however, enumerated as such by Temminck, Man d'Orn de l'Eur. Tom. i. p. 92.

grotesquely moving from one leg to the other on its perch, accompanied at the same time by a bow or inclination of the head sideways. It screamed greatly during the night.

Tawny Owl—*Ulula stridula*, Selby.—This species is mentioned as Irish in several of the statistical surveys of our counties and other catalogues. It never occurred to the late Mr Templeton, nor have I seen an Irish specimen.

Snowy Owl—*Surnia nyctea*, Dumeril.—On June 9, 1835, I had the satisfaction of communicating an account of the snowy owl's appearance in Ireland to the Zoological Society of London, in whose "proceedings," 1835, p. 78, it subsequently appeared. The following is a rather more full account, as the limited scope of that most valuable work renders a condensation of matter for its pages quite necessary.

About the 26th of March 1835, a specimen of this bird was sent in a recent state to Dr Adams of Portglenone, (co. Antrim) by a person who had shot it a few days before in that neighbourhood, and who stated that a similar individual had been seen about the place where it was obtained. The specimen was presented by Dr Adams to the Natural History Society of Belfast. It is immature, agreeing with the figure in Mr Selby's "Illustrations of British Ornithology."

On the 21st of the same month, as two of my friends were out snipe-shooting at Bruslee, about twenty miles to the south-east of Portglenone, a large white owl, represented by them as twice the size of the common species of that colour (Strix flammea,) rose from the heath within a few yards of one of them, just as he had discharged both barrels at a snipe. His companion fired at it from such a distance, that, with the loss of only a few feathers, it escaped, and afterwards alighted at a short distance. On showing the specimen killed at Portglenone to one of these gentlemen, he recognized it as similar in size and colour to the bird he had seen.

In Dublin I subsequently saw a snowy owl, which had been shot in the county Mayo, also in the month of March, and am credibly informed, that a few others were obtained about the same time in different parts of Ireland. One may be mentioned as having been received from the county Longford on the 5th of April by a bird-preserver in Dublin. *

* I have lately heard of the occurrence in Ireland, of three of the rarer species of British Raptores, but have not yet had the facts sufficiently authenticated for introduction here.

IX.—*Account of a Botanical Excursion in the Alps of the Canton of Valais, Switzerland, in August* 1835 ; *and Catalogue of the Plants collected, with occasional Remarks.* By R. J. SHUTTLEWORTH, Esq. (Continued from p. 24.)

121. *Aretia* tomentosa, Schleich. Rchb.—Androsace, Gaud.

H. Ad Fissuras rupium in alpibus supra Tæsch.

Obs. Variat habitu laxiori vel congesto, et floribus brevissime vel longiuscule pedunculatis. Cl. Gaudin, hac Aretia Hall. Hist. No. 618 γ. citavit, et certe descriptio, sua cum forma laxiuscule bene quadrat : sed Hallerus capsulam quadrivalvem descripsit, quam semper quinquevalvem ut in Aretiis Androsacisque omnibus observavi.

122. *A.* alpina, L. Rchb. Germ. exc. No. 2697. excl. cit. et icone Hall. et Lam. Androsace——Gaud. non Lam. Androsace pubescens, DC. Aretia, Hall. Hist. No. 618 α.

H. In fissuris rupium M. Gemmi supra Schwarrenbach.

Obs. Optime descripsit nostram plantam cl. Hallerus, l. c.

123. *A.* pennina, Thomas. A. glacialis, Schleich. Rchb. Germ. exc. No. 2696. Androsace—Gaud. A. alpina, Lam. DC. Aretia, Hall, Hist. No. 618 β. Tab. 11. (" A. villosa, scapis unifloris.") bona !

H. In glareosis ad moles glaciales summi jugi alpium supra Tæsch.

Obs. Et hanc speciem bene descripsit cl. Hallerus, l. c, sub var. β. et corollam roseam observavit, quæ (nisi fallor) nunquam in A. alpina occurrit. Iconem citatam, nostræ plantæ recte a cl. Gaudino relatam, huc pertinere expressius significavit ipse Hallerus ; non obstantibus "auctorum Hallucinationibus non excusandis." (Rchb. l. c. No. 2697 !) et Reichenbachii ipsius—Species pulcherrima sed in eodem loco mire varians, floribus albis, carneis, roseis, et violaceo-purpureis, cum annulo flavo : caulibus laxis vel congestis, pedunculisque brevissimis vix lineam unam longis, et sæpe uncialibus. (huc. Ic. Hall. cit).

124. *Androsace* maxima, L.

H. In arvis incultis inter Varen et Siders, copiose sed exsiccata.

125. *A.* carnea, L.

H. Ad moles glaciales summi jugi alpium supra Tæsch.

126. *A.* obtusifolia, All. Fl. Ped. i. p. 90. No. 326. Tab. 46, f. 1. ejusdem Ped. Spicel. p. 22. Tab. 4, f. 2. Gaud. Rchb. α. scapis multifloris. β. scapo unifloro. A. obtusifolio β. aretioides, Gaud ?

H. In graminosis M. Gemmi supra Schwarrenbach, et *Zermatt· β. In M. Fünelen.

Obs. Var. β. differt tantum scapo folia excedenti α. var Gaudini, cl. Koch in Deutsl. Fl. ii. Aretias Androsacesque pessime exposuit: ex. gr. iconem All. Fl. Ped: ad. A. obtusifoliam, iconem All. Spici, autem ad A. lacteam ducit. Sed Allionius in Flora Ped: l. c. rem ita exponit: "Hujus Aretiæ iconem Tab. 4. f. 2 et descriptionem dedi Pedem. Speci. p. 22."

127. *A.* Chamæjasme, Wulf. (In Jacq. Misc. i. p. 194, in descript. A. villosæ L. ubi notas differentiales bene exponit.) A. villosa β. Koch. ii. p. 100.

H. In graminosis M. Gemmi supra Schwarrenbach.

Obs. Species ab A. villosa, L. et Wulf. l. c. Tab. 7. f. 3 (in Helvetia rarissime in Jurrassi cacuminibus occurrit) omnino distincta, nec cum A. obtusifolia All. confundenda.

128. *Primula* viscosa, Vill. P. viscosa α. minor, Gaud. P. ciliata Schrank. Koch. P. hirsuta, Rchb. Germ. exc. No. 2726. Pl. crit. vii. ic. 854. an Vill.?

H. Ad moles glaciales M. Fünelen, et in alpibus supra Tæsch.

129. *P.* farinosa, L.

H. In graminosis M. Fünelen et supra Tæsch.

Obs. Planta alpina sæpius variat scapo humili, floribus paulo majoribus saturatiusque coloratis.

130. *Soldanella* alpina, L. Willd. Koch. Rchb. Germ. exc. No. 2736. S. Clusii Schmidt. non? Gaud. cf. Rchb. l. c.

H. Ad nives deliquescentes M. Gemmi.

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131. *Thymus* pannonicus, All. α. lanuginosus; caule foliisque undique pilis longis griseis instructis; floribus capitato-spicatis, staminibus inclusis. Th. pannonicus, Gaud. T. pannonicus β Rchb. Germ. exc. No. 2118 excl. syn.

β. major, Gaud. Helv. iv. p. 82; foliis majoribus punctatis glabriusculis; floribus spicato-verticillatis, verticillis remotiusculis, staminibus exsertis.

H. α. ad viam inter Siders et Leuk. β. inter Stalden et St Nicholas et alibi in Valesia superiori.

Obs. I^ma In var. β—variat etiam undique minute tomentosa. Ad hanc varietatem, me judice, sine dubio referendi sunt: Thymus humifusus, M. Bieb! T. Austriacus, Berh! T. montanus, Walds. et Kit! T. serpyllum exserens, Bess! T. nummularius, M. Bieb. (E Georgia Caucasica specimen unicum a Hohenackero lectum U. T. 1834, possideo.)

T. hirsutus, M. Bieb! (quo T. pilosus Bernh! prope Vindebonas lectus, vix differt) recedit foliis anguste lineari-oblongis uninervis

(in T. pannonico valde 5–nervosis,) nervo exstanti dorso acute carinatis. T. Marschallianus MB! differt etiam foliis angustissime lineari-oblongis, fere linearibus et ex axillis valde foliosis, quasi fasciculatis. cf. Koch, Deuts. Fl. iv. p. 312, 313. et Rchb. Germ. exc. No. 2118, 2119. T. lanuginosus, Schrank! etiam differt foliis orbiculatis acuminatis.

Obs. 2da. Similitudo cum T. angustifolio non patet, ac certe notis melioribus differt quam " ramis floriferis longioribus erectioribus villosis et foliis duplo longioribus." Benth. Lab. Gen. et Sp. p. 345. Certe in spec. meis omnibus et multa ex Helvetia, Germania, Podolia, Hungaria, &c. possideo, nunquam folia linearia inveni, sed semper oblonga et oblongo-lanceolata. *cf. Benth. l. c.*

132. *Ajuga* pyramidalis, L. β. alpestris, minor e cæruleo purpurascens, foliis floralibus rubris, Gaud.

H. In graminosis M. Gemmi supra Schwarrenbach.

Obs. Formam α. in Helvetia hucusque non inveni.

133. *A.* chamæpitys, Schreb. var. canescens, foliis latioribus incanolanatis (est forsan forma monstruosa insectis producta.)

H. In arvis et incultis prope Varen.

134.* *Teucrium* montanum, L.

H. Zermatt.

135. *Nepeta* Cataria, L.

H. Ad viam inter Siders et Leuk.

136. *Leonurus* Cardiaca, L.

H. Ad viam inter Brieg et Münster.

137. *Acinos* alpinus, Moench.

H. Inter St Nicholas et Zermatt.

138. *Calamintha* officinalis, Moench.

H. In fruticetis saxosis apricisque inter Inden et Varen.

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139. *Euphrasia* officinalis, L. δ. alpestris, Koch. Deuts. Fl. iv. p. 349. δ β minima. E. minima, Schleich. Koch. Gaud. E. pratensis, α minima Rchb.

H. In graminosis M. Gemmi supra Schwarrenbach.

Obs. Corolla parva lilacina palato flavo, vel sæpe tota flava venis purpurascentibus. Forma capsulæ, emarginatura, longitudoque styli valde variabiles sunt, et in eodem individuo inconstantes: ab hac varietate vix differt E. officinalis var. alpina Rchb. exsic!

140. *E.* salisburgensis, Funk. E. alpina, Dec. Gaud.

H. In glareosis arenosisque prope Kandersteg (forma pyramidata, imbricata); in graminosis M. Gemmi supra Schwarrenbach (for-

ma parva, debilis) ; et inter St Nicholas et Zermatt ad viam (forma subimbricata, ramosa).

Obs. Etiam variabilis sed species rite constituta ; variat foliis omnibus angustis imbricatis, dentibus setaceo-productis, vel latioribus distantibus, dentibus minus acuminatis, caule ramosissimo vel subsimplici, rigido vel debili.

141. *E.* (*Odontites*) lutea, L.

H. In arvis incultis prope Varen.

142. *E.* (*O.*) viscosa, L.

H. In apricis ad viam inter Inden et Varen.

143. *Bartsia* alpina, L.

H. In M. Gemmi ad lacum infra Schwarrenbach.

144. *Pedicularis* verticillata, L.

H. In M. Gemmi supra Kandersteg et in graminosis supra Schwarrenbach. In alpibus supra Zermatt.

Obs. Spica florens capitata, fructifera, valde elongata.

145. *P.* rostrata, L. Koch. Deutsch. Fl. iv. p. 367, Gaud. non Rchb.

H. Ad moles glaciales M. Fünelen et summi jugi alpium supra Tæsch.

Obs. P. rostrata, Rchb. Germ. exc. No. 2459 et exsic ! est species aliena, P. Jacquini, Koch. l. c. p. 363. Errore Reichenbachii inductus, hucusque Pedicularem nostram rostratam a Linnæana diversam et eandem cum P. aspleniifolia Floerke existimavi, sed, præunte Kochio, has species tres inter se distinctæ habeo.

P. Jacquini, Koch, caule adscendente, foliis bipinnatifidis, spica pluriflora congesta, floribus erectis, calyce glabriusculo, filamentisque pilosis. P. rostrata Rchb. non L.

P. rostrata, L. Koch Gaud. caulo prostrato-adscendenti, foliis pinnatifidis, spica pauciflora laxa, interdum uniflora, calyce pubescenti, filamentisque barbatis.

P. aspleniifolia, Floerke, Rchb. Koch., caule erecto, foliis pinnatifidis, spica pluriflora laxa floribus patulis, calyce lanato, filamentisque vage pilosis vel glabriusculis.

146. *P.* Barrelieri, Rchb. Germ. exc. No. 2465 et exsic ! P. adscendens Gaud. non Schleich.

H. In graminosis M. Gemmi supra Schwarrenbach.

Obs. Glabriuscula, folia pinnatifida lobis profunde incisis, racemus elongatus, calycis segmenta glabra ciliata subintegra, nec foliacea ; capsula calyce duplo longior.

147. *P.* tuberosa, L. Rchb. Germ. exc. No. 2466 et exsic. ! P. adscendens, Schleich. non Gaud.

H. In graminosis alpium supra Tæsch.

Obs. Pilosa, folia bipinnatifida, lobis acute dentatis, racemus brevis subcapitatus, calycis segmenta pubescentia, foliaceo-incisa ; capsula calyce vix longior.

148. *Veronica* verna, L.

H. ad muros inter St Nicholas et Zermatt, copiose.

Obs. Specimina mea deflorata sunt, sed capsulis obcordatis compressis, lobis divergentibus ciliatis styloque brevissimo ab affinibus facile distinguenda.

149. *V.* aphylla, L. *α.* flore cæruleo. *β.* flore carneo.

H. In graminosis ad nives deliquescentes M. Gemmi.

150. *V.* Teucrium, l. latifolia Gaud. var. minor, tomentosa, racemo florifero abbreviato. V. latifolia ὁ. Pseudochamædrys Rchb. germ. exc. No. 2510 ὁ.

H. In locis aridis ad viam inter Thermas Leucenses et Inden.

151. *V.* fruticulosa, L.

H. Ad moles glaciales M. Fünelen.

152. *V.* alpina, L.

H. In M. Gemmi supra Schwarrenbach in M. Funelen.

153. *V.* bellidioides, L.

H. In M. Gemmi supra Schwarrenbach.

154. *Linaria* alpina, DC. *α.* maculata, palato aurantiaco conspicuo. *β.* subimmaculata, palato obsolete diluteque ochroleuco.

H. In glareosis, M. Schwarzseeberg.

Obs. Semina patelliformia, uno latere concavo, altero convexo: immatura ala tenui albida circumdata, matura concoloria nigra.

155. *L.* italica, Trev. Koch. Deuts. Fl. iv. p. 397, exc. Syn. Dec. L. angustifolia, Rchb. germ. exc. No. 2550, pl. crit. v. ic. 608. opt ! L. genistifolia Ser. exs ! Antirrhinum Bauhini, Gaud.

H. Ad viam inter Visp et Stalden.

Obs. Species distinctissima, nullomodo cum L. genistifolia, Mill. confundenda. Semina L. genistifoliæ angulato-pyramidata, punctata, calycis segmentis capsulam æquantibus vel superantibus: in L. italica Trev. semina orbiculata alata patelliformia muriculata, calycis segmentis capsula duplo triplove brevioribus. Antirrhinum angustissimum Lois. (ex. Aix in Sabandia, Balbis) differt foliis omnibus angustissimis, racemis laxis ; semina matura in exemplaribus meis desunt, sed immatura videntur angulata. L. genistifolia, DC. Fl. fr. No. 2653 " Les divisions du calyce couvrent presque la capsule" et Dub. Bot. Gall. i. p. 346 " calycis laciniis linearibus acutis capsulam subæquantibus" potius ad L. genistifoliam Mill. pertinet. sed notæ e calyce sumptæ forsan variabiles.

156. *Antirrhinum* Orontium, L.

H. In fossis exsiccatis prope Leuk.

157. *Physalis* Alkekengi, L.

H. In vineis prope Varen.

158. *Myosotis* alpestris, Schmidt.

H. In graminosis supra Zermatt et M. Fünelen.

Obs. Planta variabilis: caulis inferne pilis patentibus hirsutus, superne longe aphyllus racemisque appresse-strigosus: Folia strigoso-hirsuta, pilis longioribus ciliata: pili calycini vix curvato-hamati. Huc pertinet M. alpestris, Schmidt, Boh! M. alpestris bot. Scot. differt tantum calycibus fructiferis paulo majoribus, caule foliosiori, pilisque magis patentibus. M. Suaveolens, Walds. et Kit! vix differt caule elatiori, foliis calycibusque strigoso-hispidis, pilis appressis, illis, nisi basi, non ciliatis; quod odorem attinet, plantam amœnissime odoratam in alpibus Bernensibus Stockhorn et viciniis copiose legi. M. lithospermifolia, Horn, (ex exempl. unico a Balbisio misso) magis cum planta Scotica congruit, recedit tantum caule elatiori, racemisque axillaribus plurimis; sed vix species diversa. M. alpestris, Schmidt, magis habita, quam notis bonis a M. sylvatico differre videtur.

159. *M.* nana, Vill. Eritrichium nanum, Schrad.

H. ad moles glaciales summi jugi alpium supra Tæsch.

160. *Echinospermum* Lappula, Lehm.

H. In vineis inter Varen et Siders, et ad viam inter Siders et Leuk.

Obs. Variat ramis suberectis vel squarroso-patulis reflexisve. E. squarrosum, Rchb. vix diversum.

161. *Cuscuta* Epithymum, Sm.

H. Ad astragalum Leontinum in pratis alpinis supra Zermatt.

Obs. Styli vix exserti.

162. *Chlora* serotina, Koch, Deuts. Fl. iii. p. 32. Rchb. Germ. exc. No. 2809. Pl. crit. iii. ic. 351 et 350 (var. β Koch.) C. perfoliata β pusilla, serotina, foliis sessilibus imperfoliatis connatis, Gaud. Helv. iii. p. 18.

H. Copiose in paludosis Valesiæ ad Rhodanum prope Pfyn inter Siders et Leuk. cons. Chrysocomæ Linosyris, L.

Obs. Optime descripsit cl. Koch. l. c. plantam nostram, differt a C. perfoliata, L. Rchb. pl. crit. iii. ic. 349, floribus minoribus, calycis segmentis basi altius connatis, duplo latioribus trinervis nervis-

que minoribus reticulatis corollam subæquantibus; foliis in exempl. pinguioribus perfoliatis ovato-acutis, in exempl. pusillis amplexicauli-connatis sed imperfoliatis: huc spectat cit. Gaudini.

163. *Erythræa* pulchella, Fries. γ. palustris, Gaud. caule simplici superne dichotomo-paniculato.

H. In paludosis Valesiæ prope Pfyn.

164. *Gentiana* ciliata, L.

H. In pascuis prope Randaa.

165. *G.* glacialis, Vill.—β. flore albo †γ. forma monstruosa, pusilla, caule folioso, foliis elongatis, corolla difformi calyce vix longiori, viridescenti.

H. Rarissime in M. Gemmi in graminosis cac. rupium M. Schalmette et ad nives perennes supra Schwarrenbach. Copiose in M. Schwarzseeberg et cum β et γ. satis frequens in graminosis ad moles glaciales summi jugi alpium supra Tæsch.

166. *G.* campestris L. β? alpina mihi—G. chloræfolia N. ab E. e Rchb. Germ exc. No. 2825? Caulibus pedunculisque alatis, calycis segmentis eximie serrulatis, corollæ segmentis subrotundo-apiculatis vel orbiculari-obtusiusculis; foliis caulinis ovato-triangularibus obtusiusculis, radicalibus spathulatis petiolatis.

H. In ascensu M. Gemmi prope "die Wintereck."

Obs. Corollæ, superiores sæpe 5-fidæ, majores quam in G. campestri e Scotia, &c. et folia latiora, breviora. Corollæ pallide cæruleæ vel purpurascentes.

167. G. obtusifolia, Willd. Koch. Gaud.

H. Ad moles glaciales, M. Schwarzseeberg et summi jugi alpium supra Tæsch.

Obs. Corollæ superiores quinquifidæ, inferiores interdum quadrifidæ: me judice forma alpina G. Germanicæ, Willd., et hæc forsan a *G.* amarella, L. non diversa.

168.* *G.* Verna, L. var flore albo.

H. Zermatt.

169. *G.* nivalis, L. Froehl. Mon. p. 83, α. ramosissima, ramis dense foliosis, foliis subimbricatis, β. elongata, ramosa, foliis remotis. G. nivales β. Froehl. γ. pusilla, simplex, uniflora, interdum subacaulis. G. nivalis γ. Froehl. exc. syn. Villarsii.

H. α. et β. In ascensu M. Gemmi supra Kandersteg: in Alpibus supra Zermatt et Tæsch. β. ad moles glaciales M. Schwarzseeberg.

Obs. Varietates omnes, sed præsertim β. e Scotia accepi.

170. *G.* asclepiadea, L.

H. copiose in pratis uliginosis prope Kandersteg.

171.* *G.* purpurea, L.

H. Zermatt.

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172. *Cynanchum* vincetoxicum, R. Br.

H. In glareosis inter Stalden et St Nicholas.

Obs. Forma monstruosa prostrata ramosa; umbellulæ ad florem unicum depauperatæ.

173.* *Pyrola* chlorantha, Sw.

H. Zermatt.

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174. *Erica* carnea, Scop.—forma autumnalis, alabastris viridibus. E. herbacea, L.

H. In umbrosis M. Gemmi cons. Astrantiæ minoris supra Kandersteg.

175. *Rhododendron* ferrugineum, L.

H. In M. Fünelen.

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176. *Phyteuma* pauciflorum, L.

H. In graminosis M. Schwarzseeberg et copiose ad moles glaciales M. Füeblen.—Supra Tæsch.

Obs. Variat bracteis late ovatis, et subrotundis, foliis lineari-lanceolatis obovato-spathulatis, lineari-spathulatisque, apice dentatis vel integris, plus minusve ciliatis; caule humili vix 6‴ usque ad 4″ alto: persuasus sum, præunte Am. Guthnicko in "Flora oder Regensburger Bot. Zeitung," P. globulariæfolium Hoppe et Sternb. mere formam proceriorem, P. pauciflora, L. (cf. Rchb. pl. crit. iv. ic. 545, 547—549,) et vix ut varietas enumerandum.

177. *P.* hemisphæricum, L.

H. In graminosis M. Gemmi supra Schwarrenbach. In M. Schwarzseeberg, Fünelen, et supra Tæsch, et in M. Grimsula supra Obergestelen, ubique copiose.

178. **P.* humile, Schleich. Gaud.

H. Occurrit rarissima planta in graminosis ad moles glaciales vallis D. Nicolai supra Zermatt, &c.

Obs. Bracteæ interiores demum induratæ, acuminatissimæ fructus superantes, adeo ut capitulis maturis Scabiosarum similes sunt. Folia bracteæque nervo valido exstante percursæ sunt.

179. *P.* orbiculare, L. *α.* cordatum, Gaud.

H. In M. Gemmi supra Schwarrenbach.

180. *P.* spicatum, L. Var. glaberrimum, capitulo bracteato, foliorum bractearumque dentibus patentibus.

H. In sylvis laricinis inter Zermatt et valleculam Tæsch.

Obs. Glabritia solummodo, a varietate bracteata, Alp. DC. Mon. p. 198, differre videtur

181. *P.* betonicæfolium, Vill. Gaud.

H. In M. Gemmi supra Schwarrenbach, in M. Fünelen, et in alpibus supra Tæsch.

182. *Campanula* pusilla, Hænke. β. flore albo, magisque pubescens.

H. In glareosis M. Gemmi ad nives perennes supra Schwarrenbach, et lacum Dauben. β. rarius, 30–31 Aug. 1836.

Obs. Forma alpina differt a subalpina et campestri floribus majoribus, habituque laxiori.

183. *C.* glacialis, n. sp.

C. humilis cæspitosa pauciflora glabra, foliis radicalibus ovatis nitidis dentatis in petiolum ciliatum attenuatis, caulinis lineari-lanceolatis : alabastris nutantibus, floribus suberectis ; calycis laciniis subulatis erectis, corolla campanulata lobis erectis inflata, quadruplo brevioribus.

H. In glareosis ad moles glaciales M. Funelen supra Zermatt. Cons. C. pedunculati, Gaud. et Sedi repentis, Schleich. cæspites magnos laxosque efficiens.

Obs. Proxima affinitas cum C. pusilla, Hænke, et C. linifolia, Lam. Alp. DC. A C. pusilla differt corollæ forma aliena et statura fere duplo majori, styloque breviori ; a C. linifolia habitu nano cæspitoso, et corolla inflata suberecta calycis segmentis quadruplo longiori. Forma corollæ videtur omnino distincta, est nempe exactè campanulata, inferne multo latiori, superne multo angustiori, pro rata, quam in C. pusilla et linifolia. Stylus etiam in C. pusilla fere longitudinis corollæ, in nostra planta tertia parte breviori.

Species pulcherrima denuo indaganda an jure a C. pusilla diversa.

184. *C.* linifolia, Lam. C. Valdenses, β. Gaud.

H. In graminosis M. Gemmi supra Schwarrenbach.

185. *C.* cenisia, All. Ped. Tab. 6. f. 2.

H. Ad moles glaciales summi jugi alpium supra Tæsch, in glareosis.

186. *C.* rhomboidalis, L.

H. In pratis Valesiæ superioris inter Brieg et Münster.

187. *C.* Trachælium, L. β. urticæfolia. C. urticæfolia, Schmidt. Pedunculis unifloris solitariis, calycis segmentis glabriusculis ; corolla pallida.

H. Ad sepes Valesiæ sup. inter Brieg et Munster.

188. **C.* spicata, L.

H. Zermatt.

189. *C.* barbata, L.
H. In pascuis M. Gemmi.

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190. *Adenostyles* candidissima, Cass. Less. A. leucophylla, Rchb.
H. In petrosis alpinis valleculæ Tæsch, paulo infra moles glaciales.
Obs. Caulis semipedalis, bipedalis et ultra. Capris et pecori videtur grata.
191. *Petasites* niveus, Baumg. fl. Trans. lass.
H. In glareosis prope Thermas Leucenses.
Obs. Folia tantum inveni.
192.* *Senecio* viscosus, L.
H. Zermatt.
193. *S.* uniflorus, All. Ped. i. No. 728. α Allionii, mihi. S. uniflorus All. l. c. Tab. 17, f. 3. opt. Senecio caule unifloro, foliis oblongis crenato-incisis, incano-tomentosis. β. corymbosus mihi, caule 3–8 floro, capitulis minoribus, foliis altius incisis interdum subpinnatifidis, incano-tomentosis. Pluk. Tab. 39. f. 6? γ. leucanthemifolius mihi, caule corymboso, capitulis parvis numerosis congestis, foliis spathulato-ovatis, vel lineari-lanceolatis, crenatis vel inciso-pinnatifidis, facie glabriusculis, dorso incanis. S. carniolicus, Willd. Rchb. S. incanus, Scop. Hoppe exsic! S. leucanthemifolia Lezay! (in Herb nostr. "ex altissima alpe Scaletta, quæ Rhætiam ab Eugadino separat.") Chrysanthemum alpinum judenbergense Jacobææ affine. J. Bauh. Hist. ii. p. 1058 cum icon. et in Herb. Scheuchzeriano!
H. α. ad moles glaciales M. Fünelen copiose, et in alpibus supra Tæsch. β. cum α in M. Fünelen.
Obs. In var. α, formas duas legi, nempe α α macrocephala, capitulis uncialibus et α β microcephala, capitulis vix semi-uncialibus: variat etiam foliis plus minusve altius crenato-incisis, indumentoque minus copioso. In var. γ, quoad foliorum incisionem, et tomentum valde variabilis.
194. *S.* incanus, L. α. Genuinus mihi, caule simplici corymboso, capitulis coarctatis, foliis spathulato-lanceolatis, ovatisve pinnatifidis, incano-tomentosis. S. incanus, L. Rchb. germ. exc. Jacobæa pumila alpina, Bocc. Mus. Tab. 8. opt. β. elatior mihi, caule superne ramoso corymboso, capitulis laxioribus, foliis spathulato-lanceolatis, ovatisve pinnatifidis, radicalibus sæpe mere crenato-incisis, incano-tomentosis.
H. Ad moles glaciales M. Fünelen sed parcius.
Obs. 1ma. In var. α caulis vix ultra 4–uncialis, capitula minima; in var. β, caulis semipedalis et ultra.

Obs. 2da. Inter S. uniflorum, All. et incanum, L. nulla discrimina specifica adesse, ex observationibus iterum iterumque repetitis (et exempl. per multa e Germania (Styria,) Helvetia et Sabaudia possideo) persuasus sum ; et, nisi auctoritate Willdenowii, Reichenbachii, Gaudini, &c. obstante, in unam speciem ambos conjunxissem. Var. β. S. uniflori omnino inter α et γ media ; ac var. β. S. incani fere transitus in var. γ leucanthemifolium S. uniflori. Cl. Gaudin, semina S. uniflori, setulis brevissimis parum extantibus adspersa, pappumque brevem scabrum descripsit ; et semina S. incani glabra et pappum squalide albidum scabriusculumque : sed in exempl. meis S. uniflori, Carniolici et incani nullum discrimen, nisi pappum in S. incano α magis coloratum quam in β. inveni. Semina juniora semper setulis conspicuis adspersa, matura sæpe glabriuscula ; pappus in planta florenti albidus, in fructifera plus minusve coloratus, semper scaber.

Si res sic se habeat, nomen Linnæanum aptissimum ita retinendum. Senecio incanus, L. α. Linnæi—S. incanus, L. et auct. β. elatior. γ. leucanthemifolius. S. Carniolicus, Willd. et auct. δ. corymbosus, (cf. All. l. c.) ε. uniflorus, S. uniflorus All. et auct.

195. *S.* Doronicum, L.

H. In M. Gemmi supra Schwarrenbach. et* Zermatt.

Obs. Ima. Variat caule uni et multifloro, foliisque plus minusve incanis.

Obs. 2da. Senecio Scheuchzeri, Gaud ! Helv. v. p. 294, vix nisi forma alpestris S. tenuifolii ; specimen a cl. Gaudino descriptum, et in Herb. Scheuchzeriano asservatum, " Jacobea alpina laciniatæ, flore Buphthalmi ex Monte Fracto" possideo : involucrum fere ut in S. Jacobæa, sed capitula minima ; videtur forma ε localitati nata.

196. *Arnica* scorpioides, L. Aronicum—Rchb.

H. In glareosis M. Gemmi supra Schwarrenbach—in Alpibus supra Zermatt.

197. **A.* Doronicum, Jacq. α. foliis caulinis dentatis. Aronicum Doronicum Rchb. Arnica Clusii, All. Ped. Tab. 17. f. i. (sed maxima) β. foliis omnibus angustioribus, subintegerrimis. Aronicum glaciale Rchb. an Jacq ? Arnica Clusii, var. All. l. c. f. 2, (sed etiam major.)

H. Supra Zermatt.

Obs. Limites nullos inter varietates invenio.

198. *Chrysocoma* Linosyris, L.—β. minor, Hall. Vill. Gaud. Tabernæmontanus, p. 1209, f. 2. opt.

H. α. ad viam inter Stalden et Visp. β. In paludosis prope Pfyn, inter Siders et Leuk.

Obs. Corymbus var. β. valde irregularis, pauciflorus.

199. *Aster* alpinus, L.—β, flore discoideo.

H. In M. Gemmi, * supra Zermatt. β. in M. Fünelen.

200. *Erigeron* uniflorus, L.

H. In M. Gemmi supra Schwarrenbach ; in M. Fünelen.

Obs. Pulcherrima planta ; flores rosei vel albi. Var. calyce plus minusve hirsuto, et huc E. hirsutus, Hoppe.

201. *E.* alpinus, L. α. minor, uniflorus. Gaud. Helv. v. p. 266.

β. ramosus, pedalis et ultra, pedunculis unifloris foliolosis, Gaud. l. c. γ. hirsutus, foliis præcipueque caule pilis longis patulis hirsutis, calyce subtomentoso, pappo dilute carneo, semine longiori. Gaud. l. c.

H. α. In M. Gemmi supra Kandersteg et Schwarrenbach. β. in M. Gemmi prope Hospitium. γ. In alpibus supra Tæsch, et prope Randaa.

Obs. In exempl. meis var. γ. caulis uniflorus semipedalis antheræque atrofuscæ. Ad hujus species var. α pertinere videtur E. glabratus, Hoppe.

202. *Solidago* virgaurea, L. * β. angustifolia, Gaud. Helv. v. 316. γ. pumila, Gaud. l. c.

H. β. Zermatt. γ. In M. Gemmi supra Schwarrenbach.

Obs. γ. variat, caule foliisque glabriusculis vel pubescentibus, pedunculis unifloris vel racemosis, foliis inferioribus lanceolatis in petiolum attenuatis, vel ovalibus, subrotundisve longe petiolatis. Differt a planta campestri floribus facile duplo majoribus, racemo brevissimo conjesto, rhizomateque crasso longissime repenti. Ab hoc var. vix differt S. cambrica, Britann. nisi floribus minoribus.

203. *Inula* Britannica, L.

H. In paludosis prope Pfyn.

204. *Gnaphalium* montanum, L. Rchb. germ. exc. No. 1390. G. arvense, W. et Rchb. l. c. Gaud.

H. In incultis arenosis inter Stalden et St Nicholas, et in arvis incultis prope Siders.

Obs. Mihi etiam non obviæ sunt differentiæ inter Gn. arvense, L. (G. montanum, Willd.) et G. minimum, Sm., sed forsan et ego G. montanum et arvense, L. non bene intelligo.

205. *G.* Leontopodium, L. α. minus, caule 2–4 unciali vix ultra. β. elatius, caule pedali et ultra, flexuoso, capitulis majoribus, numerosioribus, bracteisque armato-patentibus.

H. α. In M. Gemmi supra Schwarrenbach, et ad lacum Dauben. β. In graminosis ad moles glaciales supra Zermatt.

Obs. Cum varietate β. bene convenit icon Rchb. G. Leontopo-

dioidis, Willd., Pl. crit. x. ic. 1292, nisi caule superne ramoso, capitulisque laxioribus, sed planta e cultura forsan mutuata. Rchb. l. c. et de planta culta commentatur. " Planta imprimis bracteis arcuatis minus tomentosis nec candidis a pulchro nostro G. Leontopodio diversa," sed hæ notæ non extant apud Willd. Spec. iii. p. 1894. Notis exceptis, icon Rchb. nostram plantam omnino refert.

206. *G.* supinum, L. Syst. Veg. (Ed. 13. c. Murray.) G. supinum Lavandulæfolium, Bocc. Mus. 107. tab. 85. G. supinum, Gaud. Helv. v. p. 241. desc. bona. Willd. Sp. iii. p. 1888. G. fuscum, var. Rchb. Germ. exc. No. 1397.

H. In M. Gemmi supra Schwarrenbach, et in saxosis ad lacum Dauben. * Zermatt.

Obs. G. supinum, Sm. Eng. Fl. Ed. 2da. iii. p. 416, non hac sed ad sequentem G. pusillum Hænke pertinet, ut videtur ex observationibus suis de icone Bocconii citata, nam Gn. supinum lavandulæfolium Bocc. a Linnæa ad suum G. supinum allatum est, et bene refert plantam juniorem G. supini, Bot. Helv. et Germ. (Rchb. in germ. exc. No. 1397 in ann. et add. figuram Bocconii ad G. uliginosum refert.) Utramque specierum e Scotia accepi et in Herbario meo, e fere omnibus localitatibus copiose sed intermixtae extant, et dubitor an vere inter se distinctæ. Interdum ægre distinguendæ sunt, quanquam formæ extremæ valde distinctæ. G. supinum gaudet foliis latioribus minus tomentosis, capitulis sæpius capitato-spicatis numerosis (4-12,) magis coloratis, brevissime pedicellatis ; caulibus vix cæspitosis, biuncialibus et ultra, spicisque sæpissime arcuato-cernuis, occurrit etiam capitulis sparsis, interdum subremotis, pallidioribusque, sed semper numerosioribus quam in sequenti. Hujus species varietas videtur G. fuscum, Scop. non Lam.

207. *G.* pusillum, Hænke. Willd sp. iii. p. 1889, Gaud. l. c. desc. bona. G. alpinum Lightf. Scot. i. p. 470 cum icon. opt. G. supinum, Sm. e descr. et annot.

H. In M. Schwarzseeberg et Fünelen.

Obs. Descriptio Willdenowiana optima, nisi " flores sessiles, et calycis squamæ glabriusculæ ex toto fuscæ." Phylla nempe pubescentia, sed multo minus quam in præcedenti ; color variabilis. Differt a præcedenti caulibus sarmentosis procumbentibus, florentibus magis erectis paucifloris, sæpius unifloris, sed interdum quinquefloris ; capitulis omnibus remotis, plus minusæ pedicellatis ; foliisque linearibus utrinque argenteo tomentosis. Ab hac specie, videtur, cl. Smith varietatis uni et paucifloris præcedentis non separavit, et forsan recte sed formam spicatam ad Gn. sylvaticum retulit.

208. *G.* carpathicum Wahl. Carp. p. 258 cum icone. Gn. alpinum,

Gaud. Rchb. pl. crit. viii. ic. 996. (Antennaria hyberborea, Don. Lindl. syn. (?) e Rchb. germ. exc. No. 1398 in add.)

H. In. M. Gemmi supra Schwarrenbach. In. M. Funelen.

Obs. In exempl. meis capitula omnia distincte pedunculata. G. carpathicum, Wahl.! differt tantam capitulis congestis, foliisque latioribus, sed in icone suæ capitula etiam, quoque minus distincte, pedunculata sunt.

209. * *G.* dioicum, L.

H. Zermatt.

210. *G.* luteo-album, L.

H. Ad viam inter St Nicholas et Zermatt et inter Visp et Brieg.

211. *Chrysanthemum* atratum, L.

H. In pascuis M. Gemmi prope Hospitium Schwarrenbach, 29, 30 Aug. 1836.

Obs. Cum C. Leucanthemum, L. ut var. alpinum conjunxit cl. Rchb.

212. *C.* Alpinum, L.—β pubescens, Dub. Bot. Gall. i. 272, caule foliisque pubescentibus, squamis ciliatis. C. minimum, Vill. C. alpinum β minimum, Thom. Gaud.

H. Ad moles glaciales M. Funelen: in glareosis M. Gemmi supra lacum Dauben, 31 Aug. 1836. β. ad moles glaciales supra Zermatt.

Obs. C. tomentosum, Lois. Dub. hanc varietatem a Rchb. adjectum videtur, imprimis squamis ovatis hirsutis distinctum.

213. *C.* Halleri, Sut.

H. In glareosis M. Gemmi ad moles glaciales Lammerngletscher, 31 Aug. 1836.

214. *Achillæa* moschata, Jacq. Rchb. germ exc. No. 1443. A. Livia Scop. Del Ins. Tab. 3. opt. β. intermedia Rchb. l. c. A. intermedia Schleich. A. moschata β. hybrida, Gaud. v. p. 370, foliis villoso-tomentosis, corymbo composito, Hall. Hist. No. 112. β.

H. In glareosis ad moles M. Fünelen cum var. β. et summi jugi alpium supra Tæsch.

Obs. " A. moschatæ et nanæ hybrida proles. Rchb. l. c." sed hybridæ, persuasus sum, multo rariores sunt quam autumnat cl. auctor. Ad collum radicis præsertim var. β. sæpius nidulas lignosas villossissimas, insectis productas inveni.

215. *A.* Macrophylla, L.

H. In M. Grimsula infra Hospitium copiose.

216. *A.* atrata L.

H. In M. Gemmi frequens; in glareosis supra Schwarrenbach forma humilior magisque pilosa.

Obs. Valde variat quoad foliorum decompositionem et indumentum ; caulis superne semper plus minusve piloso-tomentosus, sed sæpe, ita ut etiam folia, e toto valde pilosus ; ut opinor, A. clusiana, Tausch et Rchb. Pl. crit. ii. ic. 368, non diversa et vix varietas constans, sed tantum forma e localitate orta.

217. *A.* nana, L.

H. In M. Schwarzseeberg ; ad moles glaciales M. Fünelen et summi jugi alpium supra Tæsch.

Obs. Variat etiam corymbo laxiusculo, caule foliisque minus villosis.

218. *A.* tomentosa, L.

H. In arenosis ad viam inter Stalden et St Nicholas et copiose inter Brieg et Munster.

219. *A.* setacea, Gaud. W. et Kit ? A. odorata, Murith !

H. Ad viam inter Siders et Leuk.

Obs. A. setacea Walds. et Kit ! differt foliis latioribus forsan tenuiter dissectis cauleque villosioribus. An ab A. odorata vere distincta planta Kitaibeliana, an ab A. millefolium, nostra ?

220. *A.* millefolium, L. var. foliis, caulibusque vix semipedalibus, tomentoso-villosis et floribus roseis.

H. Ad viam inter Siders et Leuk.

221. Artemisia campestris, L.

H. In apricis ad viam inter Inden, Varen et Siders.

222. *A.* nana, Gaud. Helv. V. 231. α. helvetica, gemina, racemo simplici, foliis incanis, capitulis majoribus. A. helvetica Schleich. Rchb. β. parviflora, Gaud. l. c., racemo composito, racemulis subsexfloris caulem arcte appressis, foliis minus incanis, capitulis paululum minoribus. A. campestris, β. alpina Schleich. Gaud. exs !

H. In alpibus supra Tæsch.

Obs. Planta rarissima, A. campestri affinis sed notis bonis distincta : caules trientales vix semipedales, adscendentes ; folia plerumque longe petiolata in α incano-sericea, subbipinnatifida, pinnularum laciniis lanceolatis latiusculis. Racemus in α vix 20-florus, in β. racemuli 3-6 flori. Capitula duplo-triplove majora quam in A. campestri, disco eleganter purpureo, secunda, nutantia.

223. *A.* valesiaca, All.

H. Copiose in apricis inter Varen et Siders.

224. *A.* glaciales, L.

H. In alpibus supra Zermatt—M. Schwarzseeberg.

225. *A.* spicata, Jacq. Gaud. Helv. V. 229. α. floribus per totum caulem laxius spicatis. Gaud. l.c. β. floribus superne laxius spicatis,

Gaud. l. c. γ. spica terminali densissima. Gaud. l. c. † δ. foliis caulinis linearibus indivisis. Gaud. l. c.

H. α. ad moles glaciales summi jugi alpium supra Tæsch. β. in M. Schwarzseeberg et Fünelen. β. γ, et δ. rarius. In rupibus M. Gemmi supra Schwarrenbach.

Obs. Var. † omnes enumeratæ variant foliis caulinis palmato-incisis, pinnatifidis, et linearibus integris.

226. *A.* mutellina, Vill. Gaud. A. rupestris, All. non L. A. glacialis Wulf. Hoppe exs ! non L. Variat. α foliis caulinis apice trifidis, summis simplicibus, pedunculis axillaribus unifloris aphyllis, caule valde cæpitoso. β. foliis omnibus palmato-pinnatifidis argenteo-sericeis, pedunculis axillaribus uniflorus aphyllis, caule humilori. γ. foliis radicalibus elongatis, caulinisque subpalmato-pinnatifidis, pedunculis axillaribus unifloris aphyllis, caule elato. δ. pedunculis axillaribus elongatis foliolosis, plerumque trifloris. A. mutellina, Vill. Dauph. iv. Tab. 35.

H. α, γ, δ. in glareosis ad moles glaciales supra Tæsch. β. et γ. In M. Fünelen.

227. *A.* Absinthium, L.

H. Fere ubique in Valesia vulgaris.

228. *Carduus.* An nov. sp. ?

H. In pascuis alpinis M. Fünelen satis copiose.

Obs. 1ma. Species mihi ignota, sed exemplare unico, quanquam perfecto, novam speciem generis spinosissimi instituere nolo, sed ad nullam specierum Floræ Germaniæ, Helvetiæ, Galliæve redigere possum.

Carduus foliis lanceolatis decurrentibus pinnatifidis, laciniis inciso-spinosis ; caule superne nudiusculo unifloro, involucro hemisphærico, phyllis linearibus erectis subappressis, nervo valido percursis.

Caulis pedalis et ultra tomentosus, inferne dense foliosus, foliis decurrentibus ubique alatus spinosusque, superne nudiusculus vel folio unico semidecurrenti instructus ;—Folia, præsertim subtus, piloso-tomentosa, utrinque ad nervos pilis crassis valde articulatis intricatis arachnoideo-floccosa, lanceolata fere pinnatifida, laciniis valde approximatis latiusculis spinuloso-dentatis, spina valida terminatis : terminali producta ;—Capitulum terminale, sesquunciale erectum vel suberectum, læte purpurascens, pedunculo vix incrassato tomentoso ; involucrum subtomentosum, phyllis erectis, spina brevissima terminatis.

Capitulum duplo major quam in C. acanthoidis, L. :—videtur affinis C. alpestri Walds et Krit ! a quo differt capitulo majori, caule

simplici tomentoso, multo majus alato spinosoque et foliorum laciniis arcti approximatis subtus lanuginoso tomentosis.

C. leptophyllus, Gaud. differt, foliis glabris, capitulo multo minori ("duplo fere minori quam C. deflorati"—in planta nostra duplo fere majori) sed aliis notis bene congruit.

C. acuminatus, Gaud. etiam differt capitulis minoribus capitato-aggregatis phyllis omnino patulis.

Obs. 2da C. acanthioides, Auct. Brit. videtur certissime, C. crispus et pinnatifidus, Rchb. Germ. exc. No. 1893.—Spec. mea ab am Campbell prope Edinburgumlecta, foliis subtus incano-tomentosis vel sublanatis, et capitulis numerosis dense aggregatis gaudent.

C. acanthoides Germanorum, Rchb. pl. crit. X. ic. 1319, 20, 21, et exsic ! differt capitulis pedunculatis subsolitariis majoribusque, et foliis læti virentibus vix pubescentibus.

229.* *Saussurea* alpina, D. C.

H. Zermatt.

Obs. Variat foliis ovato-lanceolatis, lanceolatis lineari-lanceolatisve distincte petiolatis vel in petiolum attenuatis ; involucro phyllis exterioribus ovato-triangularibus viridibus, nigro-marginatis, purpurascentibus, vel e toto atropurpureis, appresse pilosis vel glabriusculis, interioribus lanceolatis pilosissimis.

230. *Cirsium* spinossissimum, Scop.

H. Copiose in petrosis, M. Gemmi.

231. *Centaurea* crupina, L.

H. In arvis incultis inter Inden et Varen.

Obs. Ochenia magna juniora aureo-grisea appresse sericea, pappo concolori (contra Gaudin,) matura brunneo-nigrescentia.

232. *C.* Phrygia, L. Gaud. exc. C. austriaca, L. α caule simplicissimo unifloro, foliis dentatis scabriusculo-hirtis, opacis, dentibus mucronatis. C. phrygia, β. Helvetica, Gaud. Helv. v. p. 393. β. ambigua, minor uniflora, foliis caulinis subpellucidis sinuato-dentatis hirto-pubescentibus basi attenuatis, subtrinervis. C. Phrygia. γ. ambigua, γ. β. minor, Gaud. l. c. C. ambigua, Thom.

H.* α. Zermatt. β. In M. Schwarzseeberg.

233. *C.* cyanus, L. var. pusilla, incana.

H. In arvis incultis inter Varen et Siders.

234. *C.* paniculata, L. var. β. incana, phyllis appendicibus pallidis.

H. In apricis ad viam inter Inden et Varen, Siders et Leuk, et inter Stalden et Visp.

(To be continued.)

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